Passport 4400

Hardware Installation

Manual

Part Number 211768, Rev. A

For:
Passport 4430
Passport 4450
Passport 4455

June 2001

Notice of Filing

Declaration of CE Conformance (for International sales)

A Declaration of CE Conformance is on file at the Nortel addresses shown below. The declaration lists the models described in this manual. If the unit carries the CE mark, this declaration certifies that it meets the specific EMC standards and safety (LVD) standards required for CE marking. If the product is a module, the module is CE-compliant only if it is placed in a CE-marked base unit.

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Any units not carrying the CE approval are not CE-compliant. Modules placed in these units may not meet emission standards for CE compliance.

Notice

Specifications, tolerances, and design characteristics described in this manual are subject to change without notice.

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Safety Warnings and Cautions

Various safety agencies request statements of warning or caution to help you in the safe operation of the unit. These statements also apply to any and all modules installed within the unit.

To ensure adequate cooling of the equipment a 2.0 inch unobstructed space must be maintained around all sides of the unit.

The ac power socket shall be installed near the equipment and shall be easily accessible.

Installation and access to the interior of this unit shall be made only by a qualified technician.

Connection to the network is to be disconnected before the (mains) plug is removed.

Warning

Remove power plug from the power socket before performing any service work on the unit.

The power supply is auto-ranging in this model.

The power supply cordset to be supplied in Europe must have 0.75^2mm, 3 conductor "HAR" cord type H05VV-F, terminated in a grounding type Shucko plug on one end and a molded-on IEC 320 connector on the other end.

Technical Data

Passport 4400 Series

ac units

Input Voltage:	100-240 Vac -5%, +10%
Input Current:	3A/1.5A
Frequency:	47-63 Hz

dc units

Input Voltage:	36-72 Vdc
Input Current:	5A

Um die Kühlung des Gerätes nicht zu beschränken, ist es notwendig um das Gerät herum an allen Seiten ca 5 cm Raum zu lassen.

Stellen Sie das Gerät in der Nähe einer geerdeten Schutzkontakt- steckdose so auf, dass diese leicht erreichbar und zugänglich ist.

Die Montage und der Zugang ins Innere des Gerätes sind nur einem qualifizierten Techniker gestattet.

Ehe der Netzstecker aus der Steckdose gezogen wird, müssen sämtliche äusserliche Verbindungen vom Gerät getrennt werden.

Warnung

Vor öffnen des Gerätes, muss der Netzstecker aus der Steckdose gezogen werden.

Netzteil ist mit automatischer Umschaltung entsprechend der Versorgungsspannung versorgt.

Die Netzleitung sollte ein harmonisierter Typ (HAR) sein, mit der Bezeichnung H05VV-F oder H05VVH2-F, 3G 0.75^2mm, mit einem Schutzkontakt - und einem Kaltgerätestecker (IEC 320).

Technische Daten

Passport 4400 Series

ac Geraete

Nennspannung:	100-240 V~ -5%, +10%
Nennstrom:	3A/1.5A
Frequenz:	47-63 Hz

dc Geraete

Nennspannung:	36-72 V
Nennstrom:	5A

Pour assurer un refroidissement adéquat, maintenir un espace libre de 5 cm (2 pouces) tout autour de l'appareil.

Installer la prise AC à proximité de l'appareil, dans un rayon d'accès facile.

L'installation et l'ouverture de cet appareil est permise par un technicien autorisé seulement.

Avant de débrancher la prise de courant, assurer que toutes les connexions externes ont été déconnecté de l'appareil.

Avertissement

Débrancher la prise de courant avant d'entreprendre aucun travail de réparation de l'appareil.

Ce modèle s'adapte automatique- ment au courant électrique ou voltage de la prise murale.

En Europe, brancher l'appareil à la prise murale au moyen d'un fil "HAR" comprenant 3 cables H05VV-F ou H05VVH2-F de 0.75^2mm chacun, avec à une extremité une prise de terre genre SHUCKO et à l'autre une prise IEC 320.

Donnees Techniques

Passport 4400 Series

ac appareils

Voltage d'Accès:	100-240 V~ -5%, +10%
Courant d'Accès:	3A/1.5A
Fréquence:	47-63 Hz

dc appareils

Voltage d'Accès:	36-72 V
Courant d'Accès:	5A

Notification of FCC Requirements

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications to this product, that could increase the amount of Radio Frequency Emissions from this product, without the expressed written approval of Nortel Networks could cause the product and the user to violate the FCC's Rules and Regulations, thus requiring the product to be turned off or disconnected.

If this unit is used on a DTE which requires use of shielded cables for compliance with FCC Part 15, then use of a filtered pin connector may be required to maintain FCC compliance. See the Installation section for specific applications.

Notification of Canadian Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Government of Canada Department of Industry.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Industry du Canada.

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About this document

This manual contains detailed information about the hardware components that make up the Passport 4430/4450/4455 device, hereafter referred to as a Passport 4400 unit.

Each chapter in this manual contains information pertaining to a particular phase of installing, cabling, or overall operations of the Passport 4400. The chapters are listed as follows:

- Chapter 1, Introduction
- Chapter 2, Installing the Passport 4400
- Chapter 3, Ethernet Base Module
- Chapter 4, Data Modules
- Chapter 5, T1, E1, and Digital Voice Modules
- Chapter 6, Analog Voice Modules
- Chapter 7, Interface Modules (WAN)
- Chapter 8, Indicators
- Chapter 9, Power Supplies
- Chapter 10, General Installation
- Chapter 11, Connecting a Workstation
- Appendix A, Cable Diagrams
- Appendix B, Regulatory and Telephone Company Requirements,
- Appendix C, Specifications
- Appendix D, T1 Voice Module Cabling Requirements
- Appendix E, PBX Interface Connection Diagrams

Who Should Read this Document

This manual is intended for anyone responsible for installing and upgrading Passport 4400 units and their hardware components.

Note: This manual was previously released as part number 800-1951-40. The part number is now 211786.

Introduction 1

This chapter introduces the following features of the Passport 4430/4450/4455 devices, hereafter referred to as a Passport 4400 unit:

- Ethernet Base Module on page 1-3
- Data Modules on page 1-3
- T1/E1 and Digital Voice Modules on page 1-4
- Analog Voice Modules on page 1-4
- Interface Modules (WAN) page 1-5

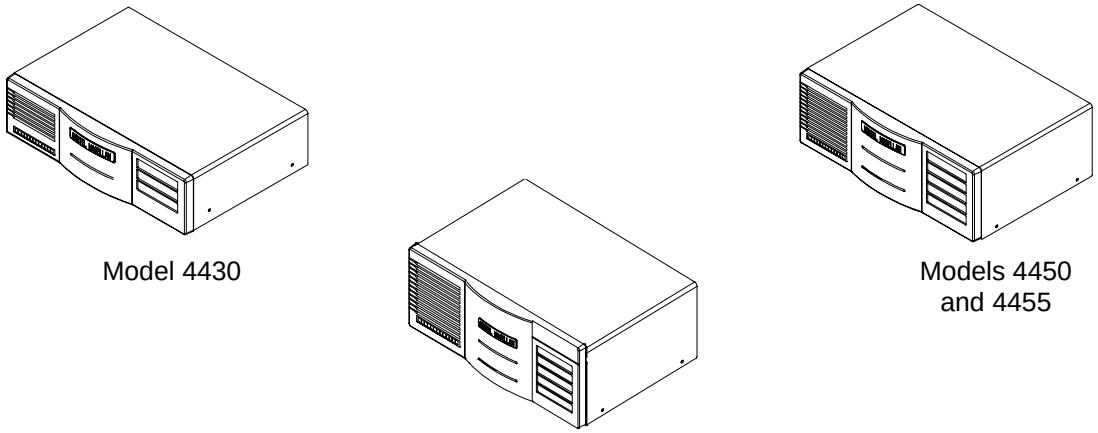


Figure 1-1. Passport 4400 Models

Passport 4400 units are multimedia, frame relay access devices deployed as an overlay to an existing Passport frame relay network. In this configuration, Passport 4400 units form distinct networks in which separate units communicate using switched virtual circuits (SVCs) provided by the Passport backbone. This arrangement allows small branch sites to consolidate multimedia traffic (such as voice and LAN) over a single low-speed network link (operating at speeds such as 56 or 64 Kb/s) and pass traffic through regional concentration sites served by Passport units.

Once deployed and configured, Passport 4400 units provide the following services:

- Voice and fax services via four different voice modules
- LAN services such as bridging, IP Prioritization, and routing IP and IPX protocols
- Frame Relay services
- HTDS services, for tunneling HDLC and SDLC traffic
- Constant Bit Rate (CBR) services
- Data Services (Async/TCP, SNA, X.25)
- VoIP
- OSPF
- WAN services
- Traffic Management
- Utility and Administration features

The mix of hardware and functions in each Passport 4400 unit depends on the application and site requirements. The major hardware components of the Passport 4400 unit are described in this chapter:

- 4430 AC, 3-slot unit, Ethernet Base Module, AC power - NTAU08CA
- 4450 AC, 5-slot unit, Ethernet Base Module, AC power - NTAU09CA
- 4450 DC, 5-slot unit, Ethernet Base Module, DC power - NTAU12CB
- 4450 ACR, 5-slot unit, Ethernet Base Module, AC power with redundant power supply - NTAU10CA
- 4450 DCR, 5-slot unit, Ethernet Base Module, DC power with redundant power supply - NTAU13CB
- 4455 AC, 5-slot unit, Ethernet Base Module, AC power with 160 watt power supply - NTAU09NA
- 4455 ACR, 5-slot unit, Ethernet Base Module, AC power with 200 watt power supply - NTAU10NA

The chassis houses the modules that provide the various services offered by the Passport 4400 unit. The number of slots indicates the maximum number of modules, including the base module, that can be supported by each unit.

Ethernet Base Module

The Ethernet Base Module performs central processing functions for the Passport 4400 unit. This module *must* be present in the lowest slot in the unit.

The Ethernet Base Module provides support for the following:

- Processor and memory
- Serial access port
- Management port
- 10BASE-T Ethernet interface
- Optional plug-in SIMMs
  - 16 Mbyte Flash Memory SIMM
    - Passport 4430/4450 - NTBQ69AA
    - Passport 4455 - NTBQ70AA
  - 16 Mbyte DRAM SIMM - NTAU95AA
  - Data Compression SIMM - NTAU94AA

Refer to Chapter 3, Ethernet Base Module, for more detailed information concerning this module and the optional plug-in SIMMs.

Data Modules

Data Modules are installed in the slots above the Ethernet Base Module (slots B, C, D, E). They consist of the following modules:

- High-speed Data Module
  - 8-Port High Speed Data Module (HDM) - NTAU74AA
  - 4-Port High Speed Data Module (HDM) - NTAU83AA
- Legacy Data Modules
  - 6-Port Legacy Data Module (LDM) - NTAU73AB
  - 6-Port Legacy Data Module with Token Ring (LDM) - NTAU71AB
  - 8-Port Legacy Data Expansion Module (LDEM) - NTAU77AB

The High-speed Data Module (HDM) provides additional port capability, identical to Port 1 on the Ethernet Base Module. The module supports RS-232/ V.24, V.35, V.36, and X.21 interfaces, determined by the cable used. The HDM can support both DTE and DCE modes.

Legacy data modules include the Legacy Data Module (LDM) and the Legacy Data Expansion Module (LEM). The LDM and LEM provide legacy protocol for branch sites connected to a Passport only network (usually one which includes a Passport 6000 unit). These include FR, X.25, ITI, TR, SNA, SDLC, DTDS and HTDS. The LDM provides six legacy service ports; the LEM provides an additional eight ports.

Refer to Chapter 4, Data Modules, for more detailed information concerning these modules.

T1/E1 and Digital Voice Modules

T1/E1 and Digital Voice Modules are installed in the slots above the Ethernet Base Module (slots B, C, D, E). They consist of the following modules:

- T1 Voice Module
  - TVM/1, Single Port - NTAY99AA
  - TVM/2, Dual Port - NTAY14AA
- E1 Voice Module
  - EVM/1, Single Port - NTAY15AA
  - EVM/2, Dual Port - NTAY16AA
- Digital Voice Module (DVM) - NTAU60AA
  - Ordering six modules - NTBQ54AA
  - Ordering twelve modules - NTBQ55AA
- Digital Voice Expansion Module (DVEM) - NTAY18AA
- ISDN BRI Voice Module (IVM/2) - NTAU76BA (for use in the Passport 4430 and 4450 only)

One Digital Voice Module (DVM) must be inserted in the TVM or EVM for each digital voice channel required. To provide full T1 or E1 support, the Digital Voice Expansion Modules (DVEM) provides additional slots for DVMs as required.

Refer to Chapter 5, T1, E1, and Digital Voice Modules, for more detailed information concerning these modules.

Analog Voice Modules

Analog Voice Modules are installed in the slots above the Ethernet Base Module (slots B, C, D, E). They consist of the following modules:

- Analog Voice Module
  - AVM/1, Single Channel - NTAU61AA
  - AVM/2, Dual Channel - NTAU62AA
- Universal Analog Voice Module (UAVM/2) - NTAU50AA
- Voice/Fax Switch Module - NTAU52AA

Up to four analog voice modules (AVMs or UAVMs) are supported on the Passport 4450 and 4455, for a maximum of eight analog voice ports. Up to two analog voice modules are supported on the Passport 4430, for a maximum of four analog voice ports.

The AVM and UAVM modules support the following interface modules:

- Foreign Exchange Station (FXS) - NTAY12AA
- Foreign Exchange Office (FXO) - NTLN23AA
- Ear and Mouth (E&M) - NTAY09AA

Refer to Chapter 6, Analog Voice Modules, for more detailed information concerning these modules.

Interface Modules (WAN)

Interface Modules for WAN are installed in Port2 and Port 3 on the Ethernet Base Module.They consist of the following modules:

- WAN Serial Interface Module - NTAU03AA
- 56 kbps CSU/DSU Interface Module - NTAU02AA
- T1 CSU/DSU Interface Module - NTAU04AA
- E1 CSU/DSU Interface Module - NTAU96AA (120 ohms) and NTAU97AA (75 ohms)
- ISDN TA U Interface Module - NTAU05AA
- ISDN TA S/T Interface Module - NTAU06AA

Refer to Chapter 7, Interface Modules (WAN), for more detailed information concerning these modules.

Installing the Passport 4400 2

This chapter describes the procedures used to set up and connect a Passport 4400 unit (Passport 4430/4450/4455).

Refer to the following manuals for relative information:

- Using Passport 4400 Install Tool Version 4.0 (800-1983-40)
- Configuring and Operating Passport 4400 (800-2002-40) on-line documentation

This chapter will take you through the following installation procedures:

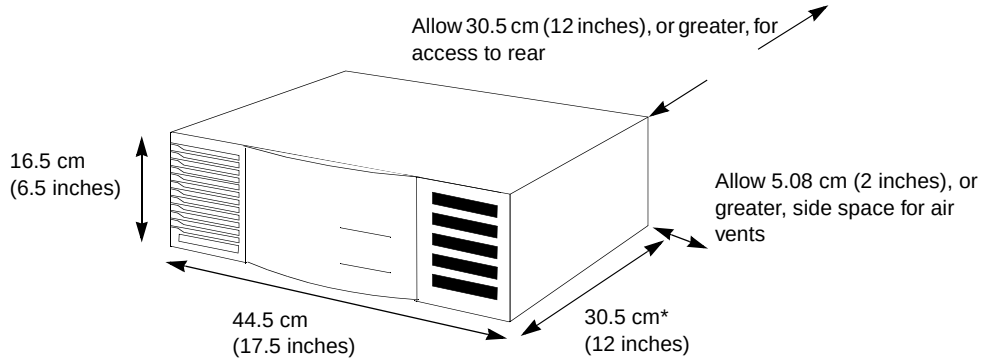
- Preparing the Site on page 2-1
- Unpacking Your Passport 4400 Unit on page 2-3
- Passport 4400 Rackmount Kit on page 2-3
- Passport 4400 Rack Installation on page 2-4
- Connecting an AC Unit on page 2-5
- Connecting a DC Unit on page 2-7

Preparing the Site

Before connecting the Passport 4400 unit, select a location that conforms to the following environmental requirements:

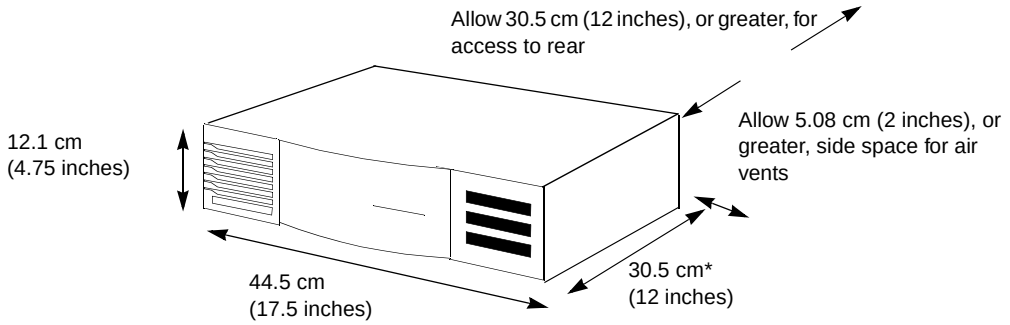
- Space requirements (Figure 2-1, Figure 2-2, or Figure 2-3)
- Surrounding temperature (page 2-3)
- Distance to the AC socket (if unit is AC-powered) – the supplied power cord is 18.29m (6 feet) long

Note: For information about installing the Passport 4400 unit in a rack, refer to page 2-4.


Allow 30.5 cm (12 inches), or greater, for access to rear
16.5 cm
(6.5 inches)
Allow 5.08 cm (2 inches), or greater, side space for air vents
44.5 cm
(17.5 inches)
30.5 cm*
(12 inches)

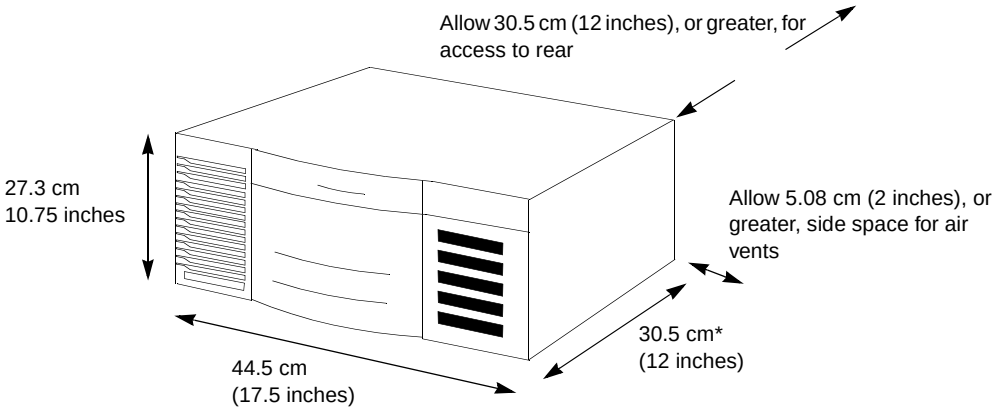
*For DC models, add 5.72 cm (2.25 inches) for DC connector

Figure 2-1. Space Requirements for a Standard 5-Slot Unit


Allow 30.5 cm (12 inches), or greater, for access to rear
12.1 cm
(4.75 inches)
Allow 5.08 cm (2 inches), or greater, side space for air vents
44.5 cm
(17.5 inches)
30.5 cm*
(12 inches)

*For DC models, add 5.72 cm (2.25 inches) for DC connector

Figure 2-2. Space Requirements for a 3-Slot Unit


Allow 30.5 cm (12 inches), or greater, for access to rear
27.3 cm
10.75 inches
Allow 5.08 cm (2 inches), or greater, side space for air vents
44.5 cm
(17.5 inches)
30.5 cm*
(12 inches)

*For DC models, add 5.72 cm (2.25 inches) for DC connector

Figure 2-3. Space Requirements for a 5-Slot Redundant Power Supply Unit

Environmental Specifications

Temperature - Operating: 0 to 50°C (32° to 122°F)
Storage: -40° to 70°C (-40° to 158°F)

Relative Humidity - Operating: 10% to 90% (non-condensing)
Storage: 0% to 95% (non-condensing)

Unpacking Your Passport 4400 Unit

Follow the instructions below to unpack your Passport 4400 unit.

1. Read the labels on the box prior to opening the box.

   Note: Make sure that you keep the packing list included. It contains model numbers and information about the Passport 4400 unit and all modules included.

2. Remove the shipping material and any hardware (cables, modules, etc.) shipped in the box along with the Passport 4400 unit. Place these modules on a table near the installation site.

3. Slowly ease the Passport 4400 unit out of the carton by firmly gripping its sides and lifting straight up. (Be sure to use proper lifting technique when removing the Passport 4400 unit from the carton. Do not bend over at the back when lifting.)

4. Place the equipment out on a table close to the installation site.

5. Check the packing list against the contents. Report any damage or lost articles to the shipping carrier.

6. Save the packing materials in case you need to move the unit.

Once the carton is unpacked, verify that you have received all the equipment you have ordered.

Passport 4400 Rackmount Kit

The Passport 4400 unit may be installed in a rack using an available Passport 4400 rackmount kit.

In addition to the rackmount shelf, each kit contains the following parts:

- Four screws
- Four washers — nylon filler
- Four washers — nickel finish
- Four clip nuts

Passport 4400 Rack Installation

1. Install the clip nuts on the rack.
2. Place the shelf in the rack.
3. Secure both sides of the shelf to the rack, using the provided screws and washers (see Figure 2-4 below).
4. Position the unit on the rackmount shelf from the rear. Place the front of the unit through the cutout in the front of the rackmount shelf (see Figure 2-5 on page 2-5).

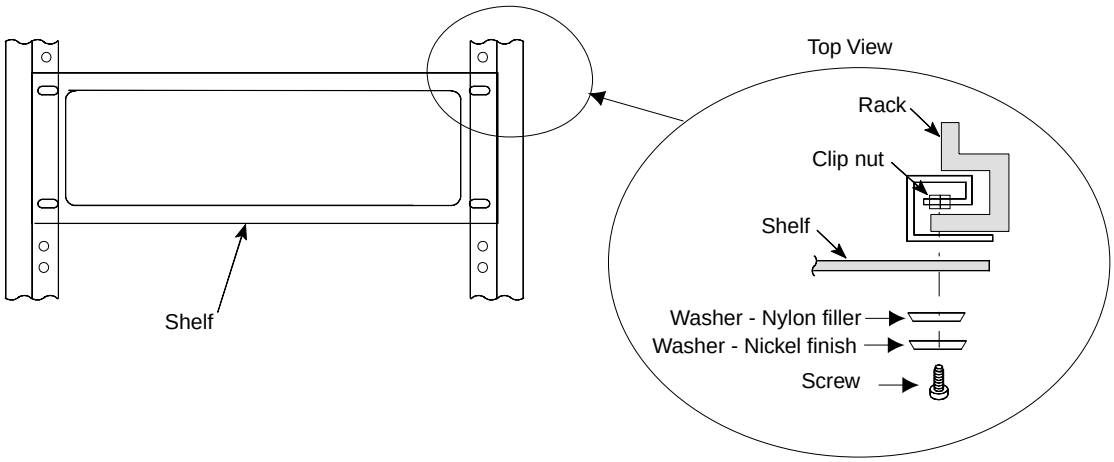


Figure 2-4. Installing the Shelf

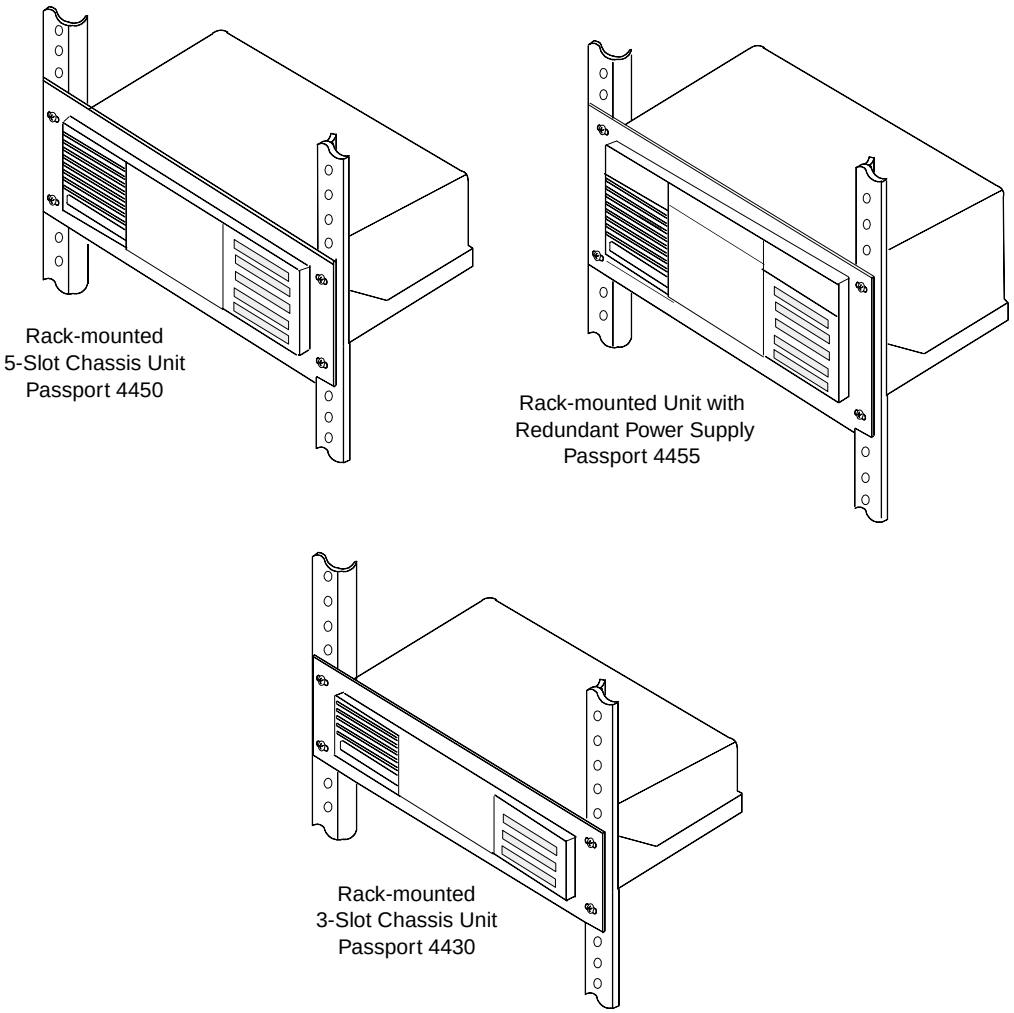


Figure 2-5. Passport 4400 Unit in Rackmount Shelf

Connecting an AC Unit

> ⚠ ***Warning:*** Before the unit is turned on, make sure there is a separate ground wire connection between the unit chassis and input power source ground.

All AC-powered Passport 4400 models require an agency-recognized AC power cord, rated at 125 V and 10 Amps. If a power cord is not supplied with your AC unit, make sure that any power cord used with the Passport 4400 unit meet these specifications. Passport 4400-approved AC power cords may be ordered separately.

If an AC power cord is supplied with your unit, the power cord should be one of the following

- A molded three-prong power cord with an appropriate connector to match the power outlet in your country, as shown in Figure 2-6 below.
- A power cord with a two-prong power connector and a green-with-yellow stripe ground wire as shown in the examples in Figure 2-7 below. If the power outlet is not grounded, contact an electrician to connect the green-with-yellow stripe wire to a fixed earth grounding point.

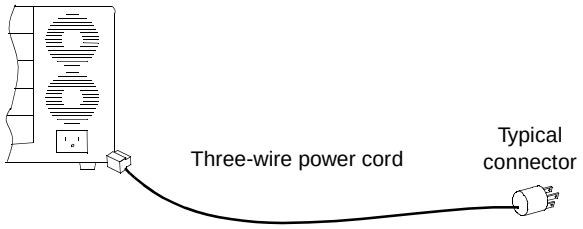


Figure 2-6. Power cord — Grounded

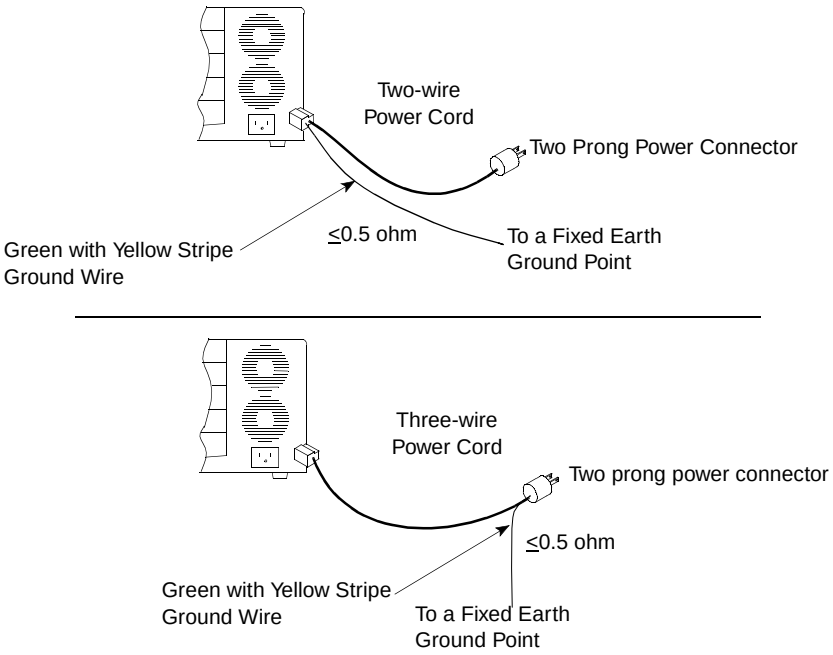

Two-wire Power Cord
Two Prong Power Connector
≤0.5 ohm
Green with Yellow Stripe Ground Wire
To a Fixed Earth Ground Point
Three-wire Power Cord
Two prong power connector
≤0.5 ohm
Green with Yellow Stripe Ground Wire
To a Fixed Earth Ground Point

Figure 2-7. Power cord — Ungrounded

To power the unit on, plug the power cord supplied with your unit into the back of the chassis and into an appropriately grounded three-pin wall outlet.

Connecting a DC Unit

> ***Warning:*** Before applying power to the Passport 4400 unit, make sure that the unit is properly grounded.

The DC version of the Passport 4400 unit has an external terminal block located on the back of the unit below the fan vents. A small black plastic door covers the terminal points. To access the terminal points, gently pull off the plastic door from the top with your finger.

The DC power source must be connected to the unit by attaching the +48 VDC, -48 VDC, and the chassis ground cords to their respective terminal points located on the block as shown below.

> ***Warning:*** The connector attaching the Passport 4400 unit to the DC power source must have a single disconnect switch.

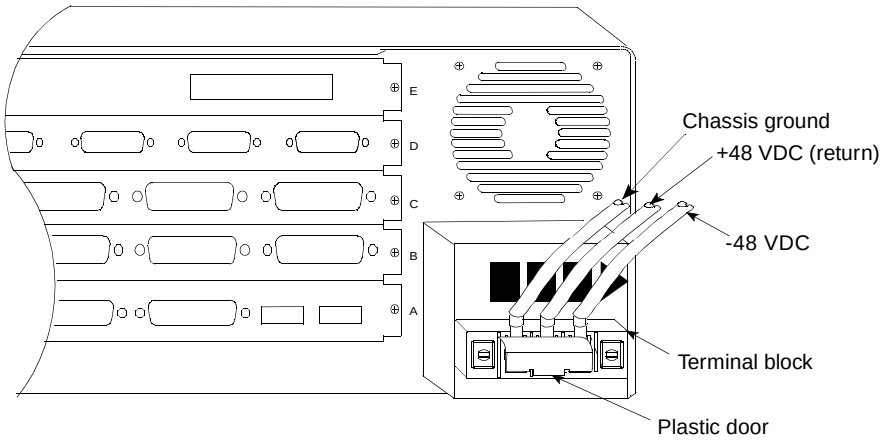


Figure 2-8. Location of DC Connection in Terminal Block

After the Passport 4400 unit is properly connected, you will have to verify that it is operating properly.

Refer to Chapter 8, Indicators, for information on the indicator functions.

Refer to Chapter 11, Connecting a Workstation, for information concerning the port connections on the Passport 4400 unit.

Ethernet Base Module 3

The Ethernet Base Module (EBM) performs central processing functions for any Passport 4400 unit (4430/4450/4455).

This chapter contains information on the following features:

- Attaching Cables to the Ethernet Base Module on page 3-3
- Management Port on page 3-4
- Frame Relay DCE Serial Access Port (Port 1) on page 3-4
- Ethernet Access Port on page 3-6 (10BASE-T)

The Ethernet Base Module includes the following:

- Processor and memory
- Serial access port
- Management port
- Ethernet interfaces (10BASE-T)
- Optional SIMMs.
  - 16 Mbyte Flash Memory SIMM
  - 16 Mbyte DRAM SIMM
  - Data Compression SIMM

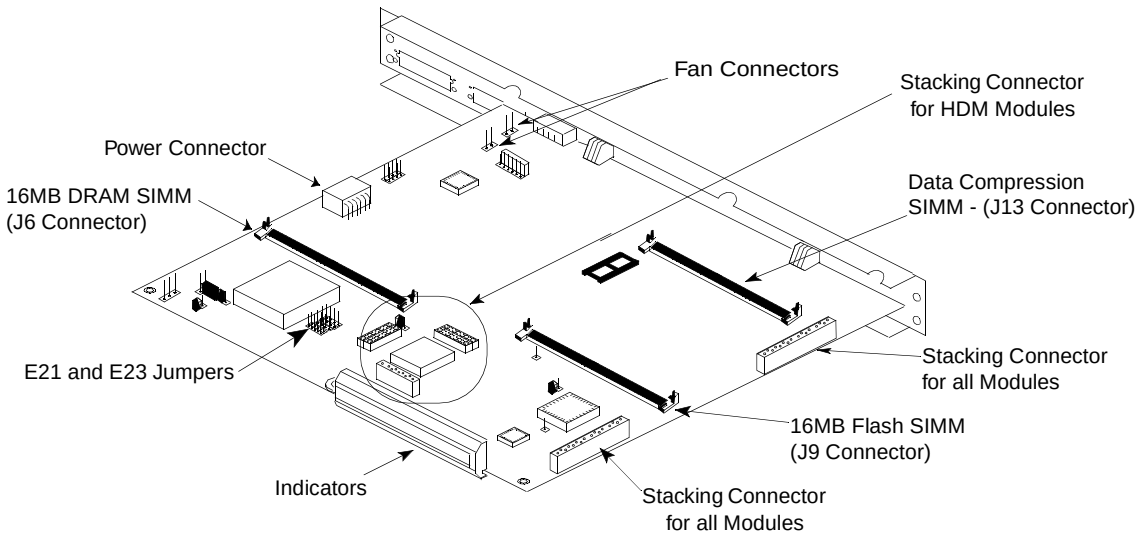

Fan Connectors
Stacking Connector for HDM Modules
Power Connector
16MB DRAM SIMM (J6 Connector)
Data Compression SIMM - (J13 Connector)
E21 and E23 Jumpers
Stacking Connector for all Modules
16MB Flash SIMM (J9 Connector)
Indicators
Stacking Connector for all Modules

Figure 3-1. Internal Components of the Ethernet Base Module

The Ethernet Base Module must be present in the lowest slot (A) for the unit to function. The remaining slots (B, C, D, E) house optional expansion voice or data modules as required. The figure below shows the rear view of a typical Passport 4450 unit.

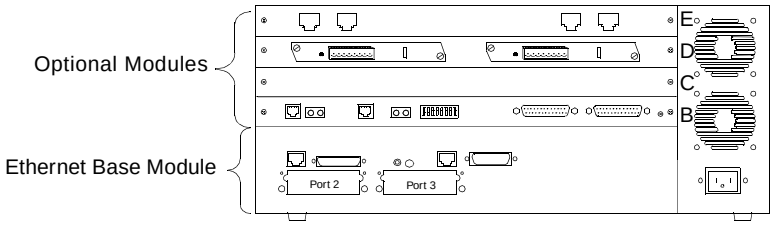


Figure 3-2. Passport 4450 Unit - Rear View

The Ethernet Base Module has six ports located on the back panel. The AUI port is not used at this time. The five usable ports are as follows:

- Management port
- Frame Relay DCE/DTE, Port 1
- Ethernet Access Port (10BASE-T)
- Port 2 (WAN)
- Port 3 (WAN)

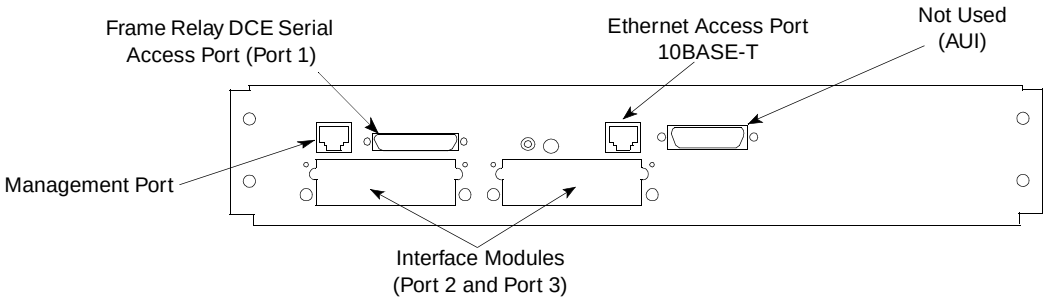


Figure 3-3. Ethernet Base Module (All Models) - Rear View

Note: Should you need to remove the Ethernet Base Module, refer to Chapter 10, General Installation, for information on opening the unit and removing the modules.

Port 2 and Port 3 are slots for optional plug-in Interface Modules supporting the following options:

- 56 Kb/s CSU/DSU
- T1 CSU/DSU
- E1 CSU/DSU
- ISDN U and S/T Interfaces
- Serial WAN

For more information on the interface modules, refer to Chapter 7, Interface Modules (WAN).

Attaching Cables to the Ethernet Base Module

The connections made in this procedure will depend on the specific site requirements. If you are not sure of the exact connections required for the Passport 4400 unit, consult your system administrator.

The following connections are only used if required.

- Connect the Management Port using an RJ-45 cable (page 3-4)
- Connect the Frame Relay DCE port using a DB-50 cable (page 3-5)
- Connect the Ethernet Access Port by using the RJ-45 cable to the 10BASE-T port (page 3-6)

Refer to the following chapters for added information:

- Chapter Figure 11, Connecting a Workstation
- Appendix A, Cable Diagrams
- Appendix B, Agency and Telephone Company Requirements.
- Appendix D, T1 Voice Module Cabling Requirements.

Management Port

The Management Port, located on the back panel of the Ethernet Base Module, allows you to connect the Passport 4400 unit to a Command Port (PC/CPU) or to a modem.

The Management Port has the following functions:

- Supports asynchronous operation using an RS-232/V.24 physical driver
- Data rate is automatically selected for speeds from 9.6 to 38.4 Kb/s
- Management port is RS-232/V.24 — a crossover cable is required for DTE operation

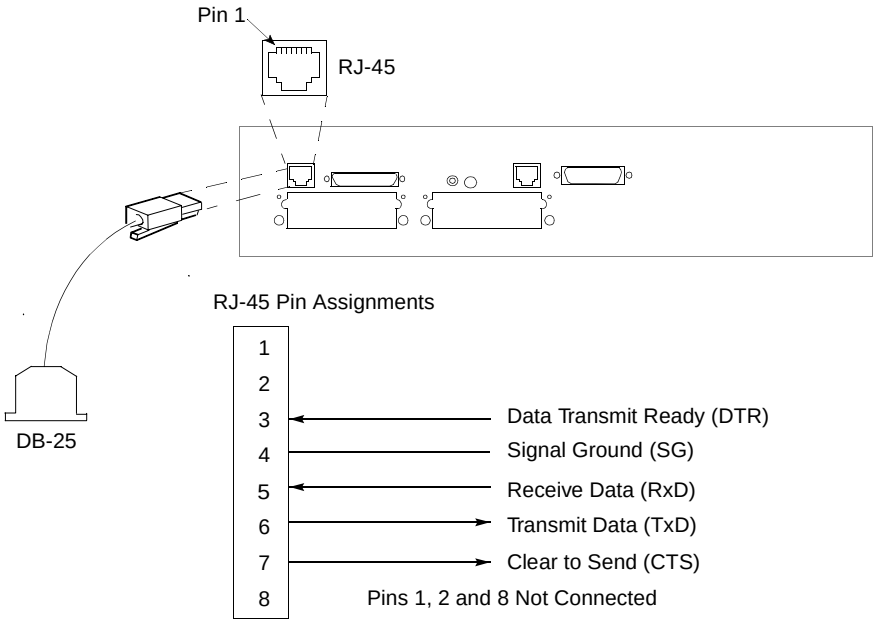


Figure 3-4. Management Port Connectors and Pin Assignments

Frame Relay DCE Serial Access Port (Port 1)

The Frame Relay DCE Serial Access Port (Port 1), located on the back panel of the Ethernet Base Module, has the following features:

- 50-pin serial data port
- Interface determined by cable: RS-232/V.24, V.35, V.36, or X.21
- Mode (DCE or DTE) determined by cable.

Notes:
- In DCE mode, the management port supplies the DTE with both transmit and receive clock.
- In DTE mode, clocking is provided externally for both transmit and receive. Default clocking speed in 192 Kb/s.

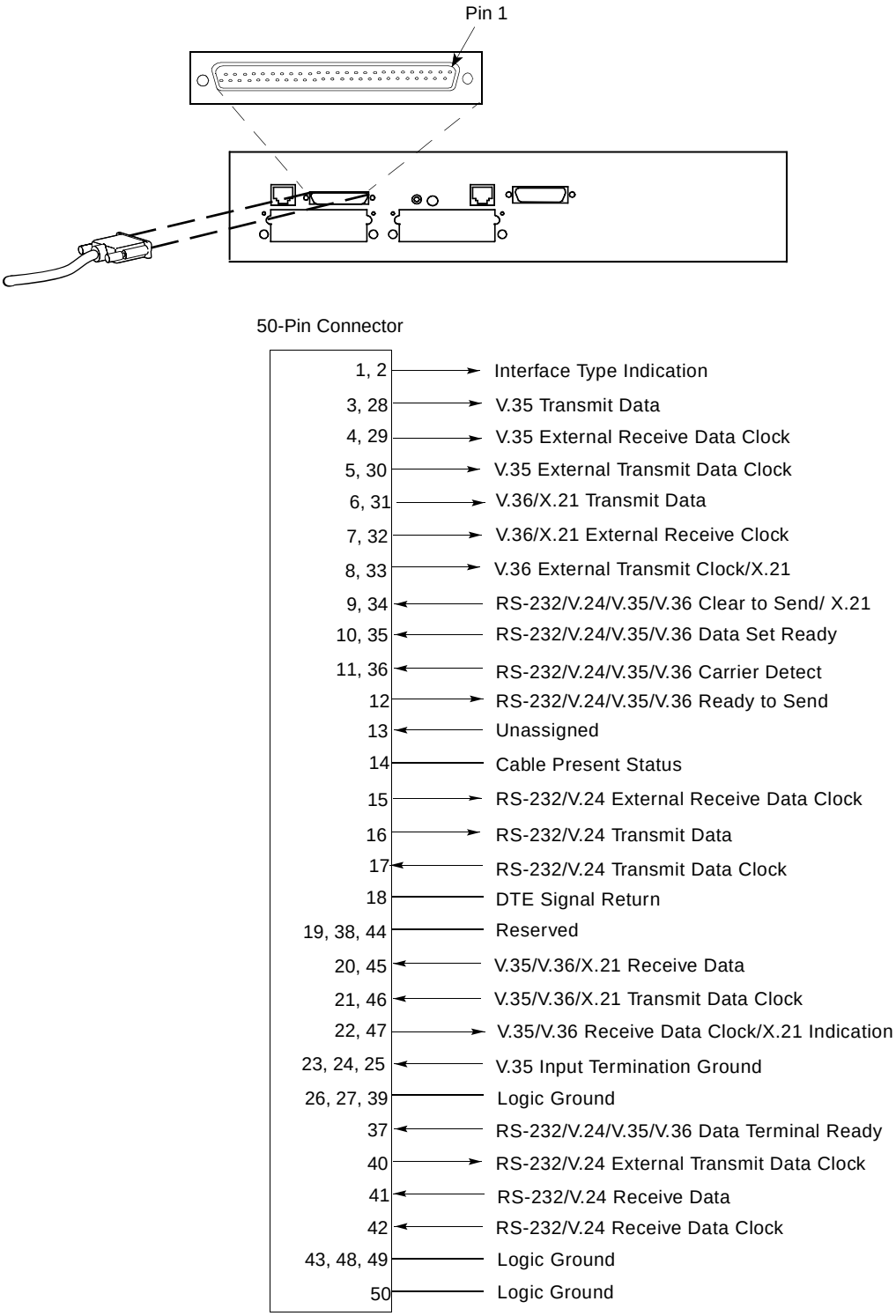

Pin 1
50-Pin Connector
1, 2 Interface Type Indication
3, 28 V.35 Transmit Data
4, 29 V.35 External Receive Data Clock
5, 30 V.35 External Transmit Data Clock
6, 31 V.36/X.21 Transmit Data
7, 32 V.36/X.21 External Receive Clock
8, 33 V.36 External Transmit Clock/X.21
9, 34 RS-232/V.24/V.35/V.36 Clear to Send/ X.21
10, 35 RS-232/V.24/V.35/V.36 Data Set Ready
11, 36 RS-232/V.24/V.35/V.36 Carrier Detect
12 RS-232/V.24/V.35/V.36 Ready to Send
13 Unassigned
14 Cable Present Status
15 RS-232/V.24 External Receive Data Clock
16 RS-232/V.24 Transmit Data
17 RS-232/V.24 Transmit Data Clock
18 DTE Signal Return
19, 38, 44 Reserved
20, 45 V.35/V.36/X.21 Receive Data
21, 46 V.35/V.36/X.21 Transmit Data Clock
22, 47 V.35/V.36 Receive Data Clock/X.21 Indication
23, 24, 25 V.35 Input Termination Ground
26, 27, 39 Logic Ground
37 RS-232/V.24/V.35/V.36 Data Terminal Ready
40 RS-232/V.24 External Transmit Data Clock
41 RS-232/V.24 Receive Data
42 RS-232/V.24 Receive Data Clock
43, 48, 49 Logic Ground
50 Logic Ground

Figure 3-5. Pin Assignments Frame Relay DCE Serial Access Port (Port 1) and All Data Modules

Ethernet Access Port

The Ethernet Access Port (10BASE-T), located on the back panel of the Ethernet Base Module, connects the Passport 4400 to the Ethernet.

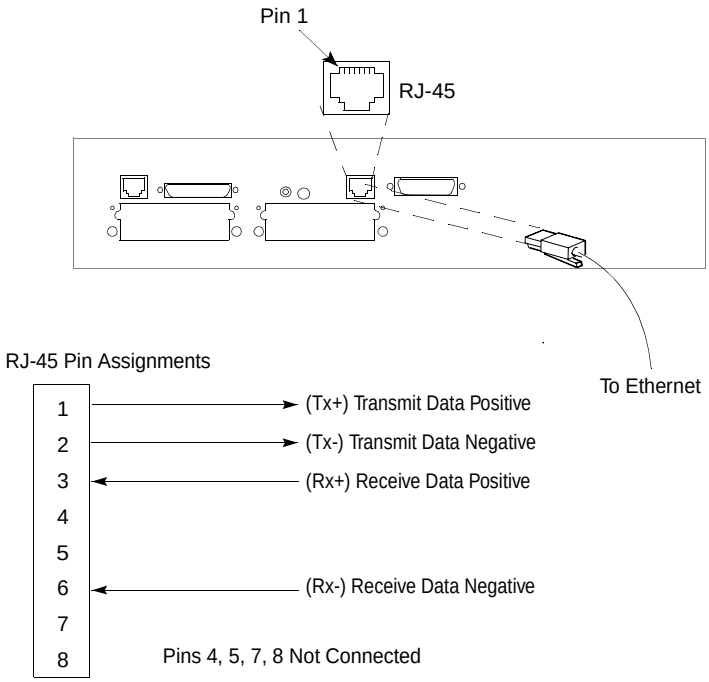


Figure 3-6. Ethernet 10BASE-T Connector and Pin Assignments

Refer to the following chapters for added information:

- Appendix B, Agency and Telephone Company Requirements.
- Appendix D, T1 Voice Module Cabling Requirements.

16 Mbyte Flash Memory

A 16 Mbyte Flash Memory SIMM (Passport 4430/4450 - NTBQ69AA, Passport 4455 - NTBQ70AA) must be installed for Release 2.0 and above software. This daughterboard contains the latest software configuration for the Passport 4400 unit and can be either factory installed or field upgradable. This SIMM is plug-and-play and no jumper settings need to be altered.

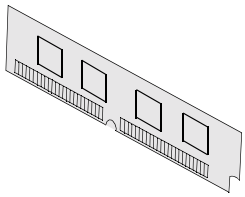


Figure 3-7. 16 Mbyte Flash Memory SIMM

For instructions on removing and installing the SIMM, refer to Removing and Installing SIMMs on page 3-10.

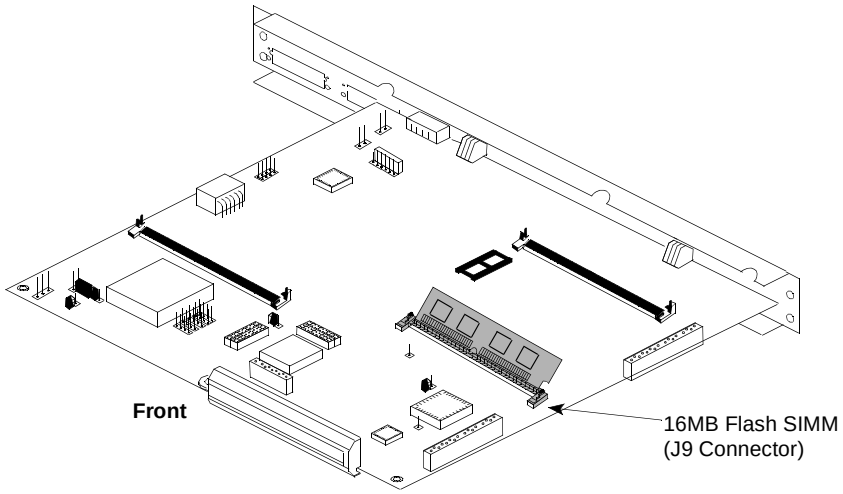


Figure 3-8. Location of 16 Mbyte Flash Memory SIMM Connector

16 Mbyte DRAM

The Passport 4400 offers an optional 16 Mbyte DRAM SIMM (NTAU95AA) offers an optional is needed for software version 3.1 and above. For instructions on removing and installing the SIMM, refer to Removing and Installing SIMMs on page 3-10.

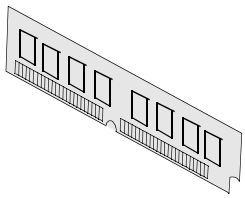


Figure 3-9. 16 Mbyte DRAM SIMM

The correct E21 and E23 jumper block positions for the 16 Mbyte DRAM SIMM is 4M, (as opposed to 1M for the 8 Mbyte DRAM SIMM) as shown in Figure 3-10.

Note: When installing the 16 Mbyte DRAM SIMM, you must have the E21 and E23 jumpers (2 each) set in the correct position (4M) for your unit to boot up after installation.

Use a pair of small needle-nose pliers when making changes to the jumper settings. Carefully lift each jumper block and place it over the appropriate pins. See Figure 3-10 for location of E21 and E23 jumpers.

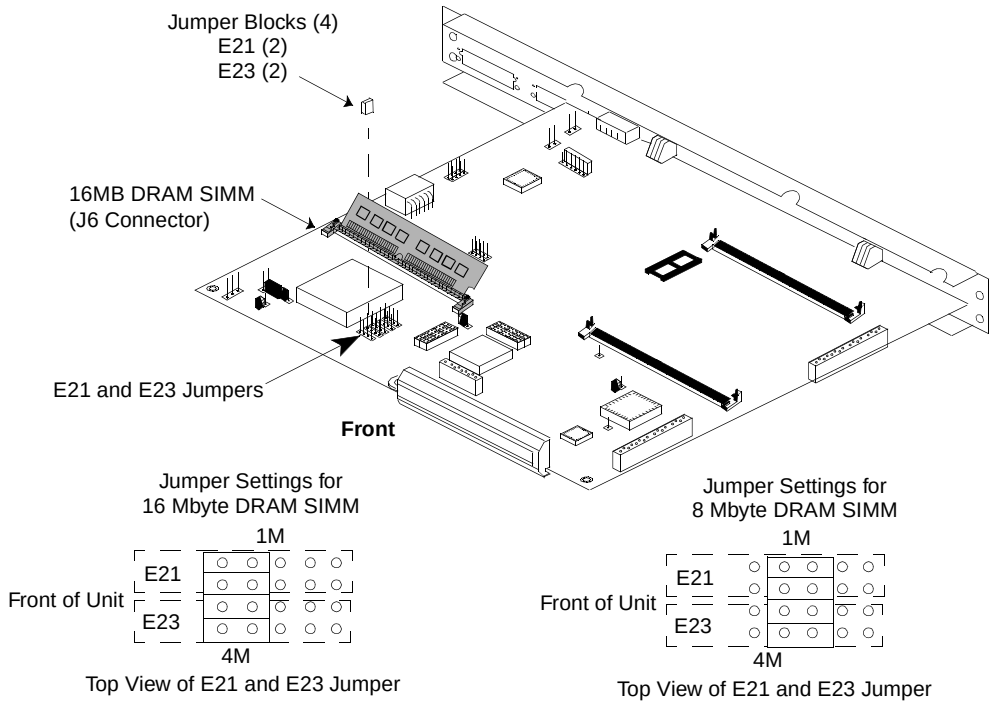


Figure 3-10. Location of 16 Mbyte DRAM SIMM Connector and Jumper Settings

Data Compression

The Data Compression feature (NTAU94AA for Release 4.0 and later) enhances the speed of the data supporting RFC1490 SVC and preconfigured RFC1490 PVCs. This SIMM is plug-and-play and no jumper settings need to be altered.

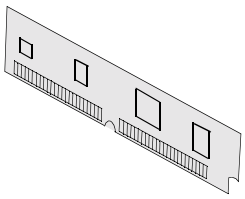


Figure 3-11. Data Compression SIMM

Note: Be sure you have the correct Ethernet Base Module (NTAU01BA or later version) before installing and using this feature.

Refer to Figure 3-12 for location of the Data Compression SIMM connector (J13).

For instructions on removing and installing the module, refer to Removing and Installing SIMMs on page 3-10.

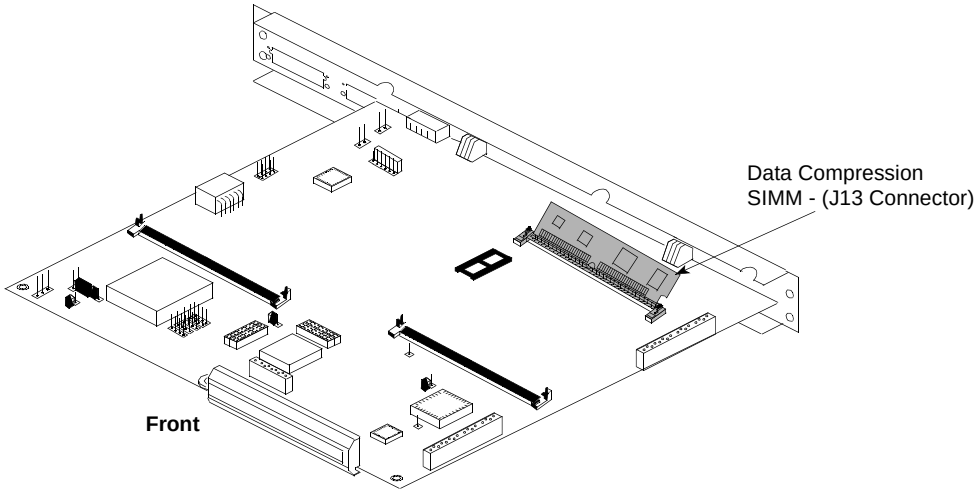


Figure 3-12. Location of Data Compression SIMM Connector

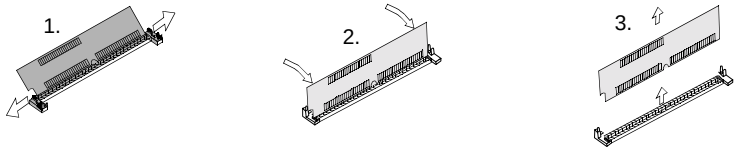
Removing and Installing SIMMs

Instructions for removing and installation are the same for the following SIMMs:

- 16 Mbyte Flash Memory SIMM
- 16 Mbyte DRAM SIMM
- Data Compression SIMM

Follow the procedure below to remove a SIMM in the Passport unit:

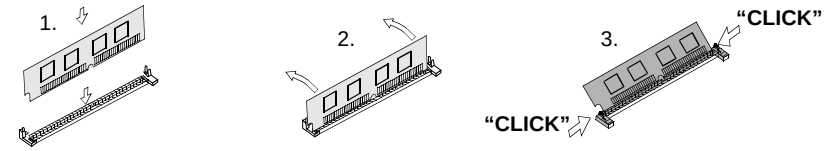
1. Gently push out the connector locking flanges located at each side of the slot housing the SIMM.
2. Move the SIMM to a vertical position.
3. Lift up the SIMM.



Follow the procedure below to install or replace a SIMM in the Passport unit.

> ⚠ ***Warning:*** Do not attempt to remove or install any SIMM while power is connected to the Passport unit. Be sure to disconnect the unit from the power source.

1. Insert the SIMM into the connector.
2. Gently push down and the back on the SIMM.
3. The SIMM will “click” into the connector locking flanges.



Data Modules 4

This chapter describes the types of Data Modules available for your Passport 4400 unit (4430/4450/4455). These modules are defined as Legacy Data Modules and High-Speed Data Modules.

Legacy Data Modules are described as follows:

- 6-Port Legacy Data Module
- 6-Port Legacy Data Module (with Token Ring)
- 8-Port Legacy Data Expansion Module
- LDM Memory Expansion Module

High-Speed Data Modules are described as follows:

- 8-Port High-Speed Data Module
- 4-Port High-Speed Data Module

Legacy Data Modules

Low-speed data service is provided via the Legacy Data Module (LDM) and the Legacy Data Expansion Module (LEM).

Legacy Data Module (6-Port and 6-Port with Tokin Ring)

This module provides interface ports that support legacy data protocol in Passport 4400 units. Available modules are as follows:

- 6-Port - (NTAU73AB)
- 6-Port with Tokin Ring (NTAU71AB)

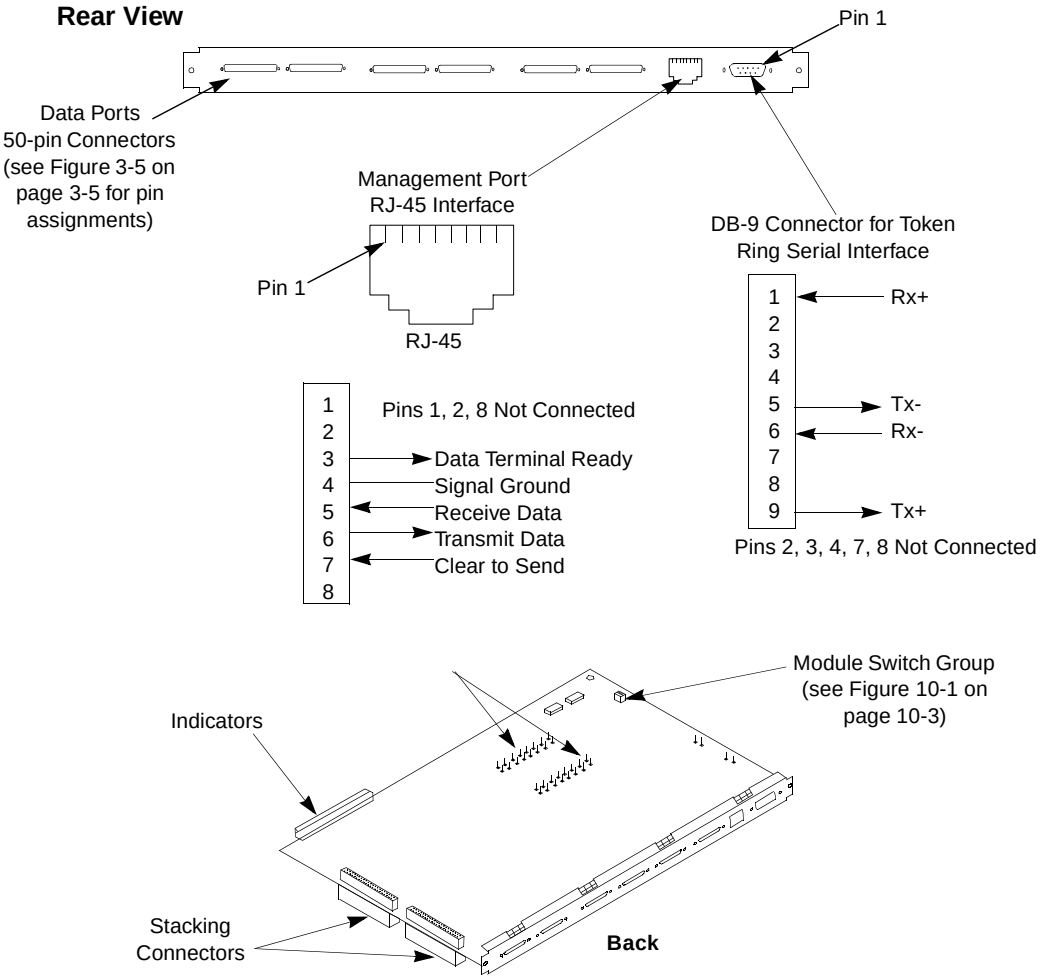


Figure 4-1. Legacy Data Module

Legacy Data Expansion Module

The Legacy Data Expansion Module (NTAU77AB) offers additional interface ports that support Legacy Data protocol in your Passport 4400 unit.

Note: The connections will depend on the specific site requirements. If you are not sure of the exact connections required for the Passport 4400 unit, consult your system administrator.

Use a 50-pin connector to join each serial data port to your local equipment. The type of cable used will depend on the class of service you desire. Refer to Appendix A, Cable Diagrams, of this manual.

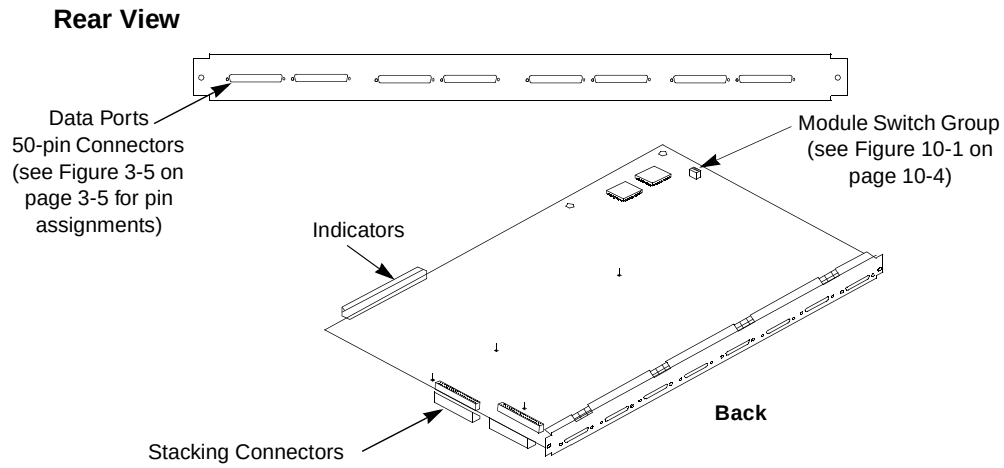


Figure 4-2. Legacy Data Expansion Module

Memory Expansion Module for Legacy Data Module

For Passport 4400 units containing a Legacy Data Module and one or more Legacy Data Expansion Modules, you must order an LDM Memory Expansion Module for the Legacy Data Module. This module provides 1 Mbyte of SRAM memory required to support the additional ports provided by the Legacy Data Expansion Module.

Installation Procedure for the Memory Expansion Module

The following procedure explains how to install a Memory Expansion Module on the Legacy Data Module already installed in the Passport 4400 unit.

For information on opening the unit and removing/installing modules, refer to Chapter 10, General Installation.

⚠ ***Caution:***	Modules cannot be inserted into or removed from the unit while the Passport 4400 unit is operating. This could cause damage to the unit or interruption of network service or both.

> ⚠ ***Caution:*** Do not connect external cables until module installation is complete.

> ⚠ ***Warning:*** When working inside the unit, be sure to take all precautions against electrostatic discharge.

1. Disconnect the power from the chassis.
2. Remove the cover.
3. Remove all cables from the Legacy Data Module that the Memory Expansion Module will be installed on.
4. Remove all modules above the Legacy Data Module.
5. Remove the Legacy Data Module.

   Note: When installing the Memory Expansion Module on to the Legacy Data Module, firmly support the bottom side of the area where the Memory Expansion Module is being installed to limit the flexing of the Legacy Data Module.

6. Line up the connectors on both modules; the latching posts on the Legacy Data Module must line up with the mounting holes located on the Memory Expansion Module.
7. Ensure that the connectors are fully seated and the latching posts are properly latched (see Figure 4-3).
8. Install a two-position shorting jumper (provided) onto the header marked BD P18 (see Figure 4-3).
9. Install the Legacy Data Module and the modules that were removed in step 4.
10. Install all cables, replace the cover, and reconnect the power to the chassis.

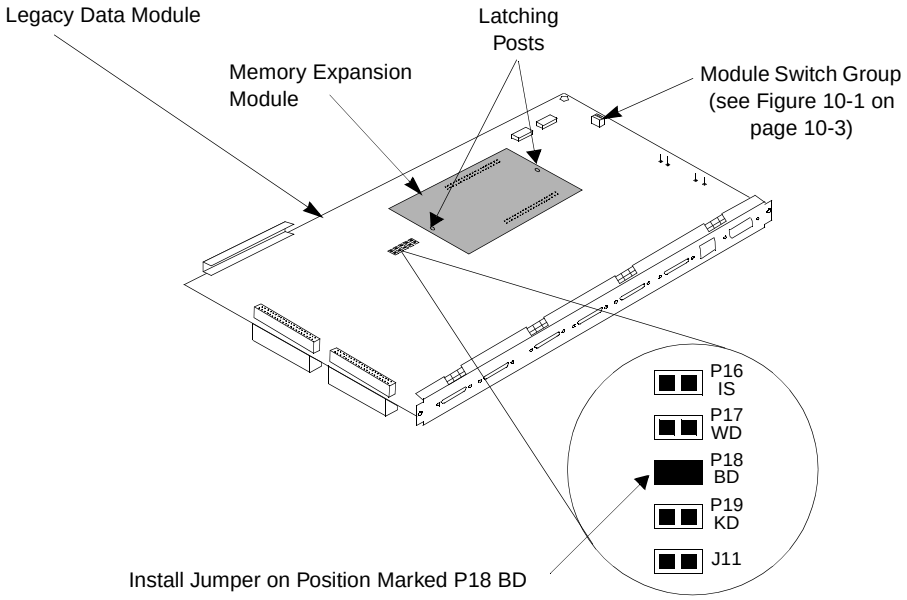


Figure 4-3. Legacy Data Module with Memory Expansion Module Installed

High-Speed Data Modules

There are two models of High-Speed Data Modules (HDMs):

- 8-Port High Speed Data Module (NTAU74AA)
- 4-Port High Speed Data Module (NTAU83AA)

The High-Speed Data Module provides additional port capability, identical to port 1, on the Ethernet Base Module. The module supports RS-232/V.24, V.35, V.36, and X.21 interfaces, determined by the cable used. The module can support both DTE and DCE mode.

Note: Connections depend on the specific site requirements. If you are not sure of the exact connections required

See Figure 3-5, on page 3-5, for Data Port pin assignments.

The Ethernet Base Module has three stacking connectors (see Figure 3-1 on page 3-1) for the High-Speed Data Module that mount into the three connectors (see Figure 4-4 below) located on the High-Speed Data Module. These connectors on the High-Speed Data Module are on both the top and underside of the module. Make sure these connectors are properly fitted.

Attaching Cables to the High-Speed Data Module

Cable connections made in this procedure will depend on the specific site requirements. If you are not sure of the connections required for the Passport 4400 unit, consult your system administrator.

For more information about cables, refer to Appendix A, Cable Diagrams.

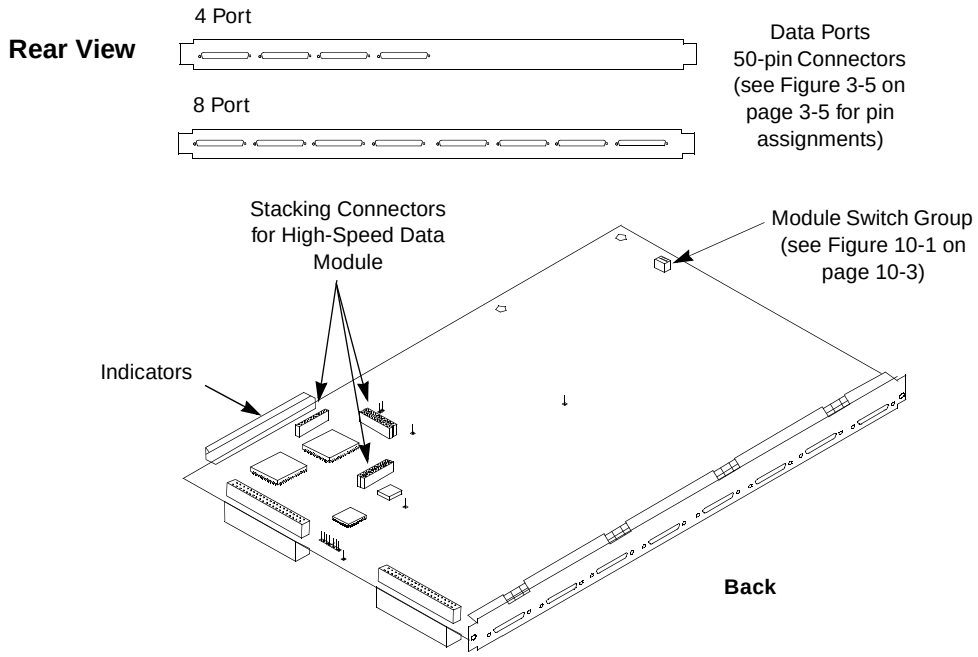


Figure 4-4. High-Speed Data Module

For further information about cables, refer to Appendix A, *Cable Diagrams*.

T1, E1, and Digital Voice Modules 5

This chapter describes the hardware features and physical descriptions of the voice modules (digital) that provide the Passport 4400 unit (4430/4450/4455) with T1 or E1 connectivity and digital/analog voice options. Included are the following modules:

- T1 Voice Module on page 5-2
  - — The Single Port T1 Voice Module (TVM/1 - NTAU99AA) provides connection to a single T1 line DS-1).
  - — The Dual Port T1 Voice Module (TVM/2 - NTAY14AA) provides connections to two T1 lines (DSX-1 and DS-1).
- E1 Voice Module on page 5-4
  - — The Single Port E1 Voice Module (EVM/1 - NTAY15AA) provides connections to a single E1 line (L1).
  - — The Dual Port E1 Voice Module (EVM/2 - NTAY16AA) provides connections to two E1 lines (L1 and L2).
- Digital Voice Expansion Module on page 5-10 (NTAY18AA), is an expansion module that contains slots to support additional Digital Voice Modules. To support a full T1 or E1 link, two Digital Voice Expansion Modules in addition to the T1 Voice Module or E1 Voice Module are required.
- DVEM Power Harness on page 5-11 (NTAU32AA), provides additional power to the Digital Voice Expansion Module.
- Digital Voice Module on page 5-12 (NTAU60AA), is a SIMM card (daughterboard) that is installed directly onto the T1 Voice Module, the E1 Voice Module, or the Digital Voice Expansion Module. Each Digital Voice Module supports one digital voice channel.
- Removing and Installing Daughterboards is discussed on page 5-13
- ISDN BRI Voice Module on page 5-14 (IVM-BRI/ST/2- NTAU76CA), is an expansion module providing the Passport 4400 unit with an ISDN interface for connection to an ISDN PBX, ISDN phone, or other ISDN protocol.

Refer to the following chapters for added information:

- Chapter 8, Indicators
- Chapter 11, Connecting a Workstation
- Appendix A, Cable Diagrams
- Appendix B, Agency and Telephone Company Requirements.
- Appendix D, T1 Voice Module Cabling Requirements.

T1 Voice Module

The T1 Voice Module is available in a single (TVM/1E - NTAY99AA) or dual (TVM/2 - NTAY14AA) model. These modules provide an interface to one or two 1.544 Mbytes T1 lines (DS-1 for connection to T1 network services and DSX-1 to a local PBX).

The T1 Voice Module also provides additional T1 connectivity for two high-speed data ports, DP1 and DP2, and to the primary and secondary ports of the Ethernet Base Module of the Passport 4400 unit.

The T1 Voice Module can support a maximum of 24 Digital Voice Modules (6 on the T1 Voice Module; 18 on Digital Voice Expansion Modules).

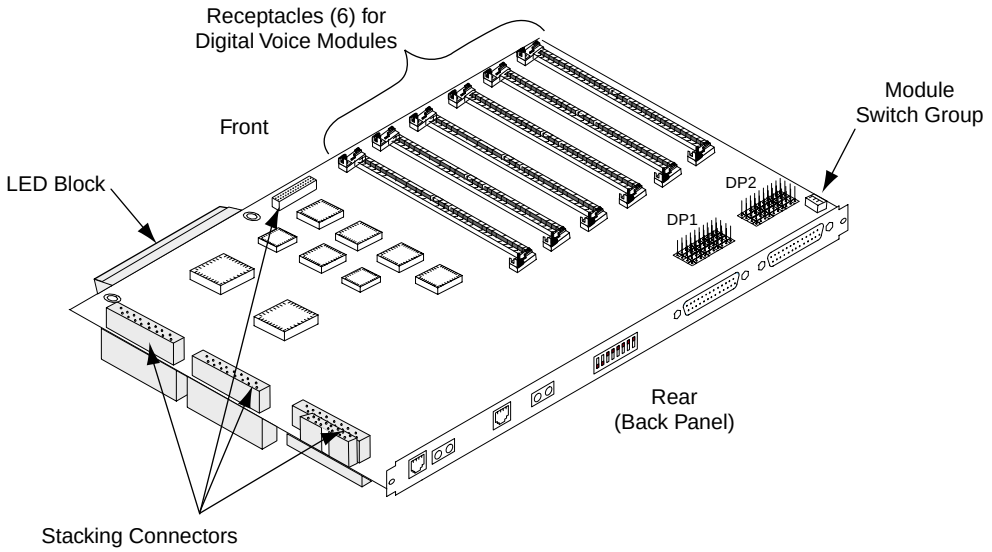


Figure 5-1. T1 Voice Module

Connectors and Pin Assignments

The figure below shows the connectors and pin assignments located on the back-panel of the T1 Voice Module. All pin assignments and other features are the same for single and dual port modules.

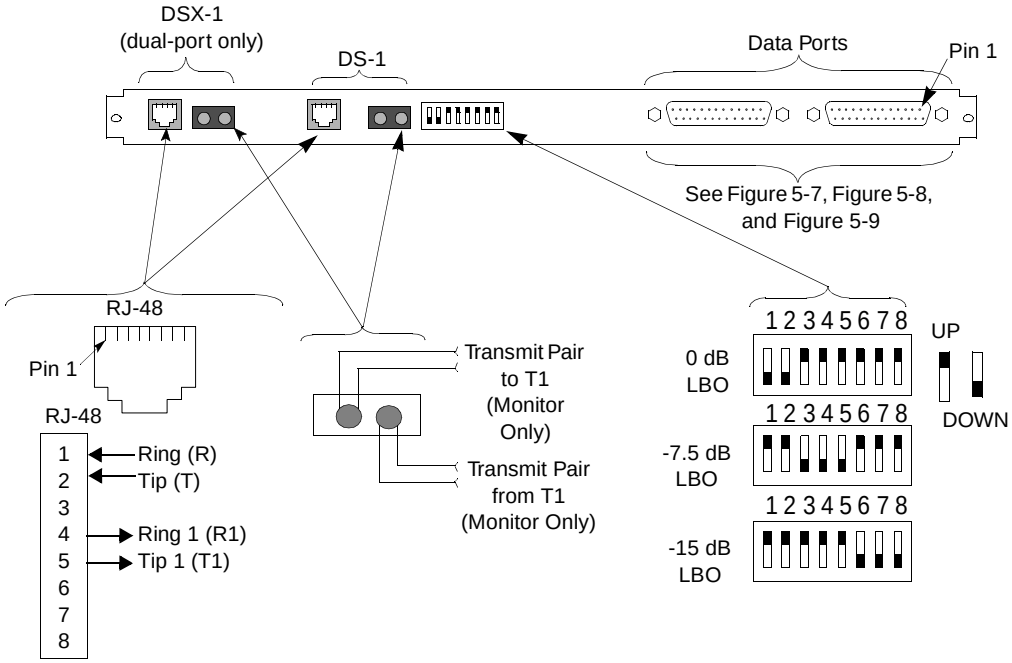


Figure 5-2. Pin Assignments for T1 Voice Module - Single and Dual Port

Note: The connections will depend on the specific site requirements. If you are not sure of the connections required for the Passport 4400 unit, consult your system administrator or refer to the following:

- Chapter 11, Connecting a Workstation.
- Appendix A, Cable Diagrams.
- Appendix B, Agency and Telephone Company Requirements.
- Appendix D, T1 Voice Module Cabling Requirements.

E1 Voice Module

The E1 Voice Module is available in a single (EVM/1) or dual (EVM/2) port module. The E1 Voice Module provides a user interface to one or two 2.048 Mbytes E1 lines, L1 interface, to a local PBX and a L2 interface for connection to E1 network services).

The E1 Voice Module houses up to six Digital Voice Modules (DVMs). It can support a maximum of 30 Digital Voice Modules (6 on the E1 Voice Module module, 12 on each Digital Voice Expansion Modules). The Passport 4450/4455 can house a maximum of three Digital Voice Expansion Modules, while the Passport 4430 can house two Digital Voice Expansion Modules.

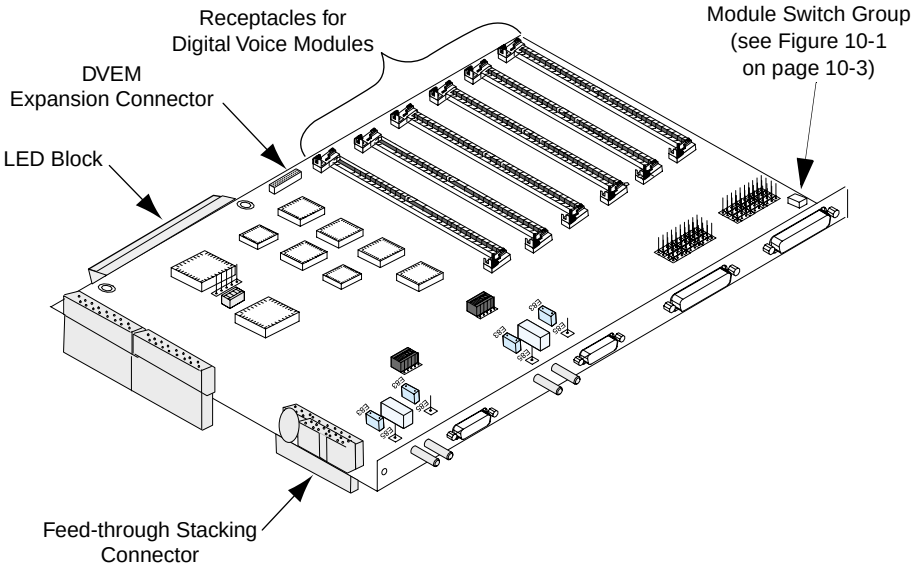


Figure 5-3. E1 Voice Module (Dual Port)

The E1 module can be connected with either a 75 ohm or a 120 ohm termination. These terminations are determined by jumper settings on the module board. If you are unsure how these jumpers are set or if you want to change the settings on the unit you have received, refer to Figure 5-6 on page 5-6, before connecting this module.

Note: The pin assignments and other features are the same for single and dual port modules.

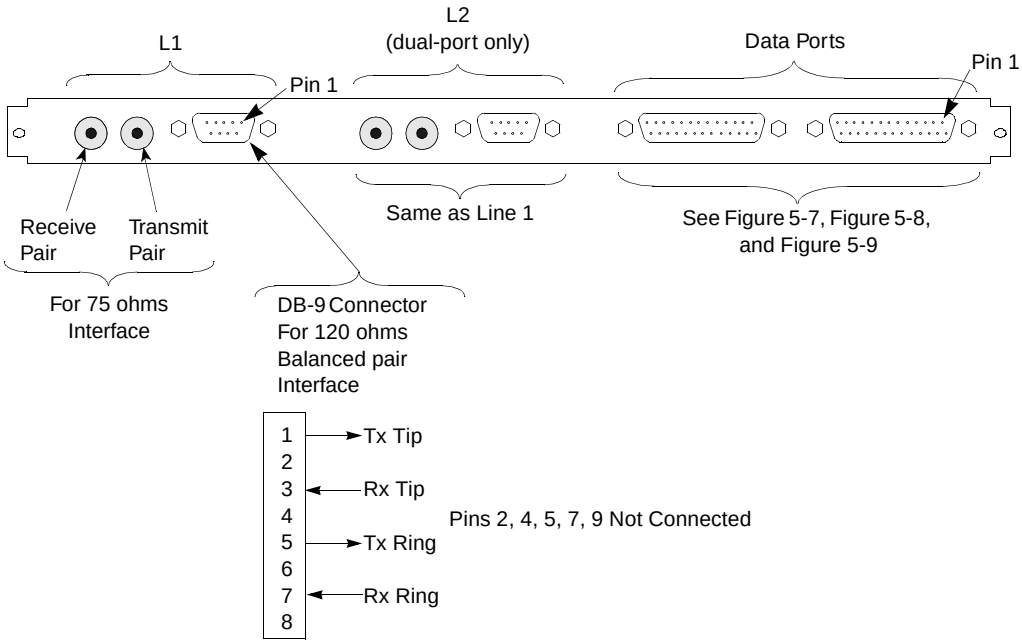


Figure 5-4. Pin Assignments for E1 Voice Module - Single and Dual Port

Note: The connections will depend on the specific site requirements. If you are not sure of the connections required for the Passport 4400 unit, consult your system administrator or refer to the following:

- Chapter 11, Connecting a Workstation.
- Appendix A, Cable Diagrams.
- Appendix B, Agency and Telephone Company Requirements.
- Appendix D, T1 Voice Module Cabling Requirements.

E1 Voice Module Impedance Strapping

Impedance for each E1 interface line is determined by the placement of a header on a jumper located on the E1 module. Impedance for each interface line may be strapped for either 75 ohms or for 120 ohms. The two lines may be strapped for the same or for different impedance.

Caution: For operation in the United Kingdom, this equipment may not be connected to an E1 Digital service using the 75 ohm interface.

The locations of the two impedance straps for line 1 are shown in the following figure.

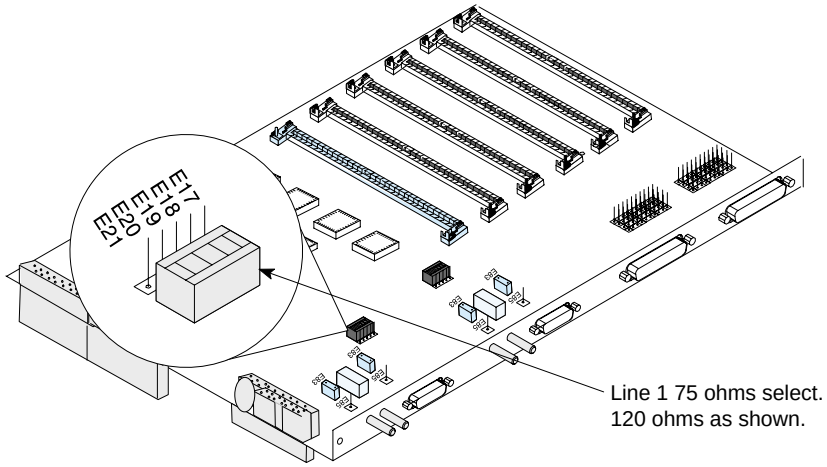


Figure 5-5. Location of the E1 Interface Line Straps

Strapping for the 75 Ohm Outer Conductor

The outer conductors of the 75 ohm BNC interface connectors may be connected to earth or isolated. Strapping is implemented by a set of headers and jumpers as shown in Figure 5-6 on page 5-6.

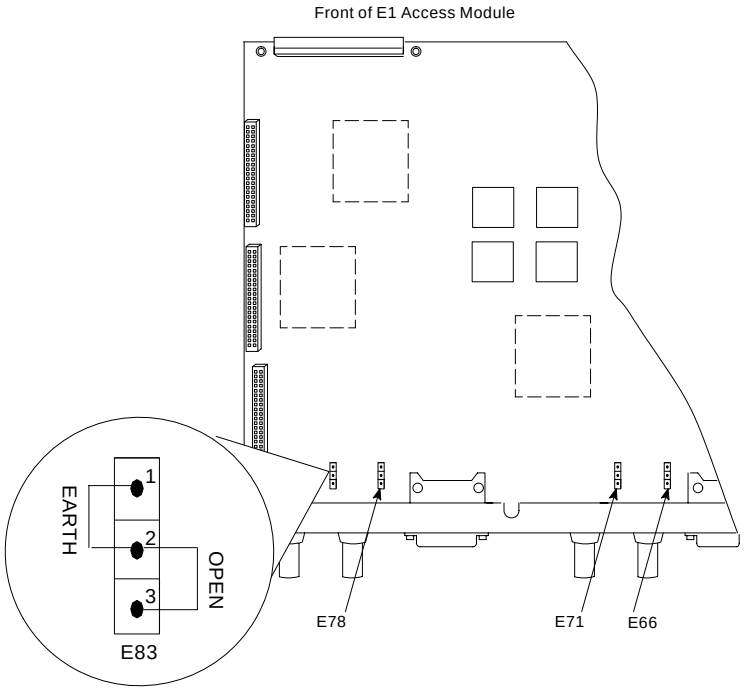


Figure 5-6. Strapping Positions for the 75 Ohm Cluster Conductor

Table 5-1. Outer Conductor Jumper Settings for the 75 Ohm Connector

Connector	To Earth	Isolated (Open)
Line 1 Rx (DSX-1)	Place jumper over E83, pins 1 and 2.	Place jumper over E83, pins 2 and 3.*
Line 1 Tx (DSX-1)	Place jumper over E78, pins 1 and 2.*	Place jumper over E78, pins 2 and 3.
Line 2 Rx (DS-1)	Place jumper over E71, pins 1 and 2.	Place jumper over E71, pins 2 and 3.*
Line 2 Tx (DS-1)	Place jumper over E66, pins 1 and 2.*	Place jumper over E66, pins 2 and 3.
* Indicates factory default setting		

Pin Assignments

The following figures show the pin assignments of the data port connectors for each of the three interface types.

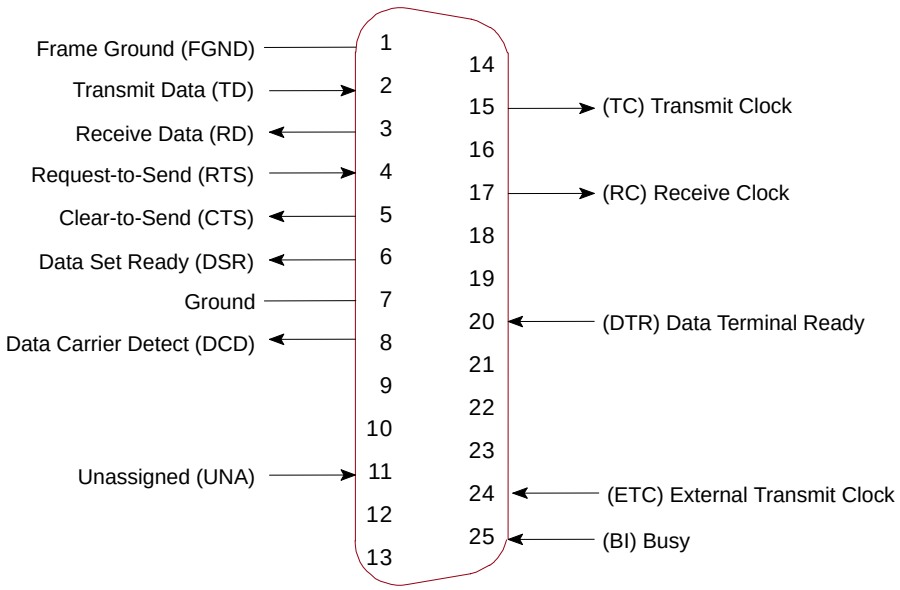


Figure 5-7. RS-232/V.24 Data Port Connector Pin Assignments

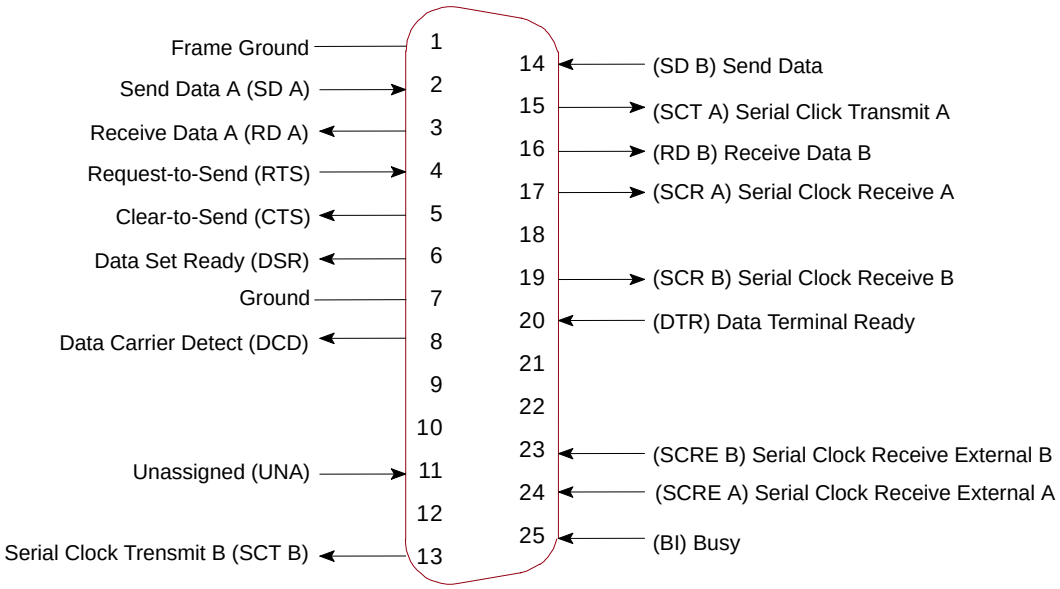


Figure 5-8. V.35 Data Port Connector Pin Assignments

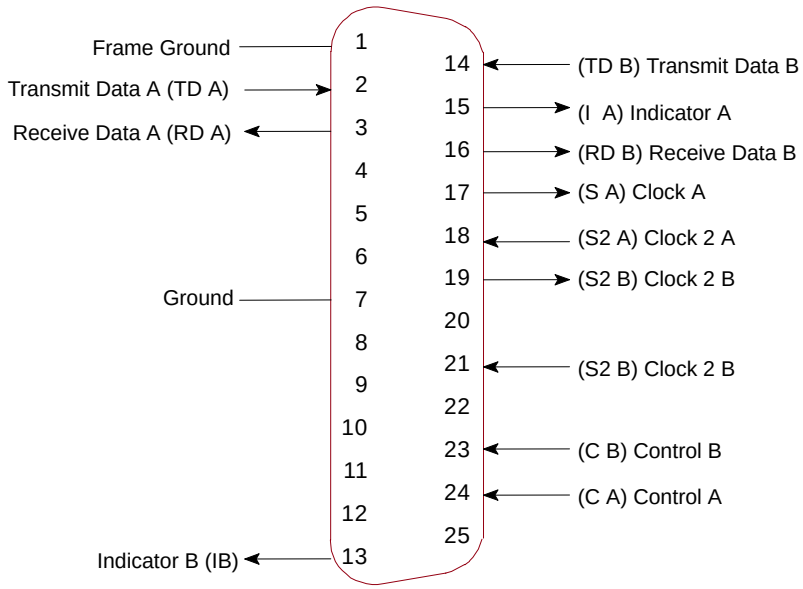


Figure 5-9. X.21 Data Port Connector Pin Assignments

Data Port Strapping

Two data port connectors are located on both the T1 and the E1 access modules. The ports can be strapped for RS-232/V.24, V.35 or X.21 physical interface. Each connector is strapped by using two headers with jumpers located on the access modules.

Note: Data ports can provide clocks up to 512 Kb/s. However, RS-232/V.24 strapped data ports are not recommended for speeds over 64 Kb/s.

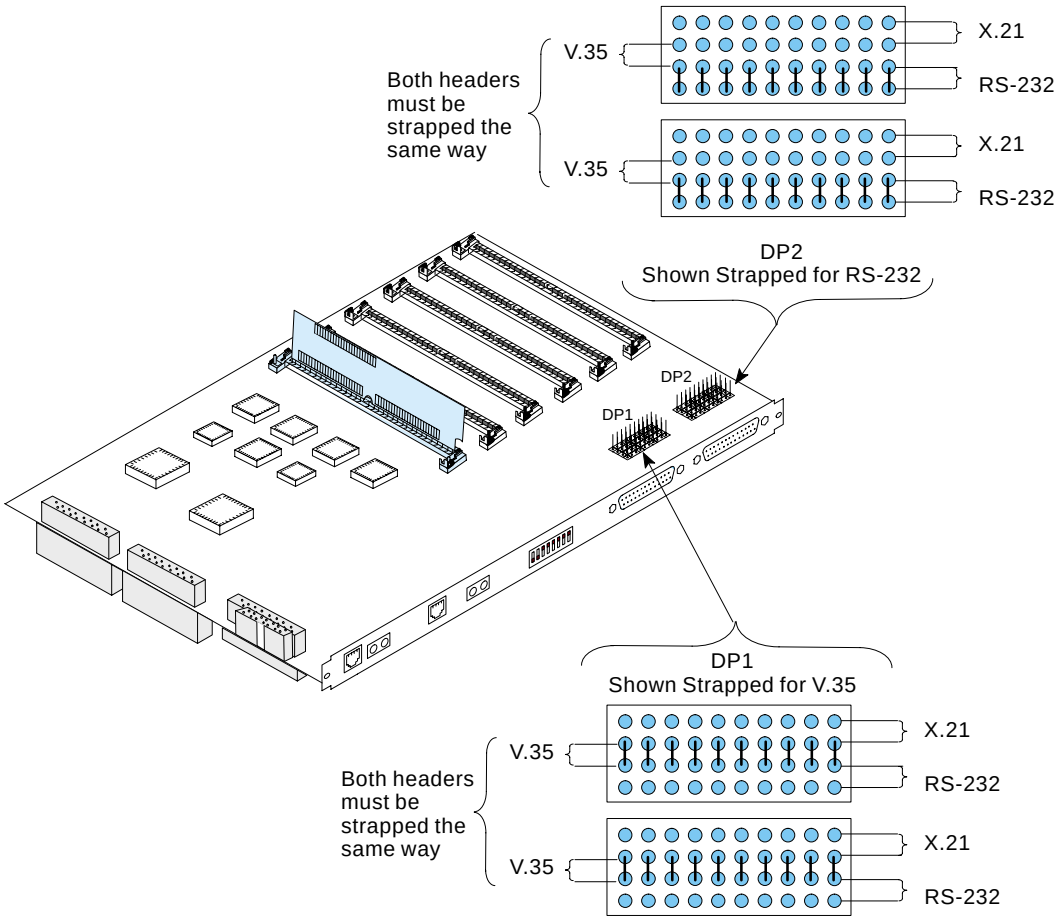


Figure 5-10. Data Port Strapping for T1 and E1 Voice Modules

> ***Warning:*** Make sure that power is disconnected from the unit that houses the access module before attempting to change the data port jumper headers.

Digital Voice Expansion Module

The Digital Voice Expansion Module (DVEM - NTAY18AA) is used to extend the number of voice channels supported by a T1 or E1 Voice Module. Each Digital Voice Expansion Module can accommodate up to a maximum of 12 additional Digital Voice Modules. By combining the Digital Voice Modules installed on the T1 or E1 Voice Module, and those installed on Digital Voice Expansion Modules, the Passport 4400 unit can support all the digital voice channels provided by a full T1 (24 channels) link or E1 (30 channels) link.

Caution: The following applies to connecting the DVEM Power Harness:

- **Do not** connect the Digital Voice Expansion Module Power Harness to the T1/E1 Voice Module.
- If your Passport 4450/4455 unit contains only one Digital Voice Expansion Module, there will be an additional, unused connector on the power harness. Leave the spare connector unconnected.

Note: The Digital Voice Expansion Module must be physically installed directly on top of the T1/E1 Voice Module or another Digital Expansion Module.

The Passport 4450/4455 can house a maximum of three Digital Voice Expansion Modules, while the Passport 4430 can house two Digital Voice Expansion Modules.

Note: The connections will depend on the specific site requirements. If you are not sure of the connections required for the Passport 4400 unit, consult your system administrator or refer to the following:

- Chapter 11, Connecting a Workstation.
- Appendix A, Cable Diagrams.
- Appendix B, Agency and Telephone Company Requirements.
- Appendix D, T1 Voice Module Cabling Requirements.

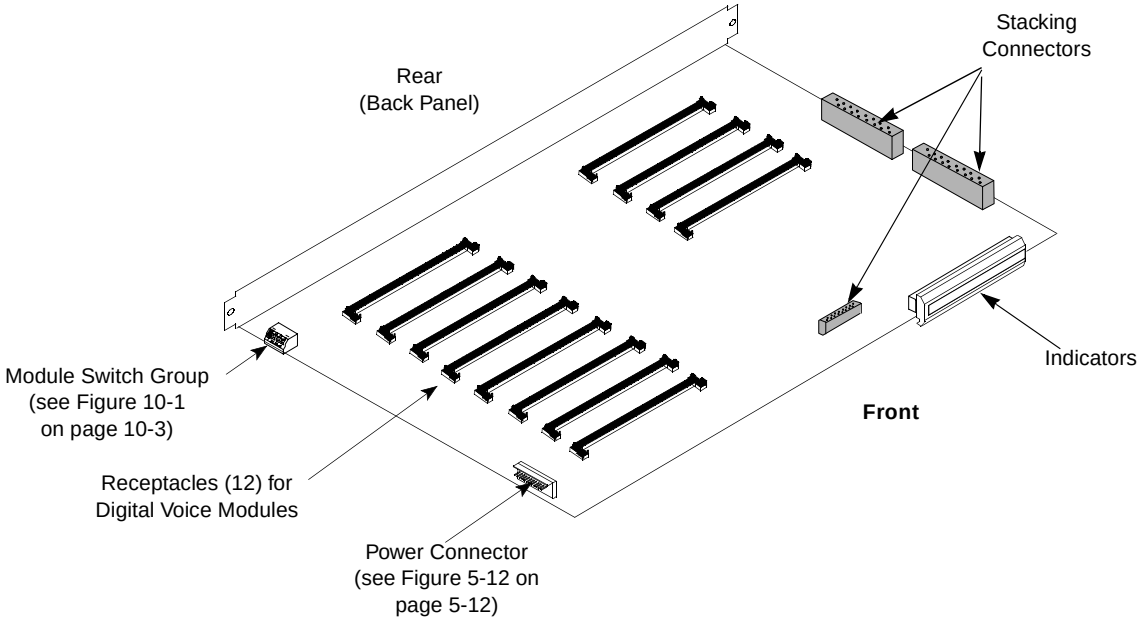


Figure 5-11. Digital Voice Expansion Module

DVEM Power Harness

You must install a Digital Voice Expansion Module Power Harness (NTAU32AA) in Passport 4450 and 4455 units (5-slot chassis only) containing any Digital Voice Expansion Modules. This harness provides the required additional power to the Digital Voice Expansion Module boards.

The Digital Voice Expansion Module Power Harness must be ordered separately.

Caution: The following applies to connecting the DVEM Power Harness:

- **Do not** connect the Digital Voice Expansion Module Power Harness to the T1/E1 Voice Module.
- If your Passport 4450/4455 unit contains only one Digital Voice Expansion Module, there will be an additional, unused connector on the power harness. Leave the spare connector unconnected.

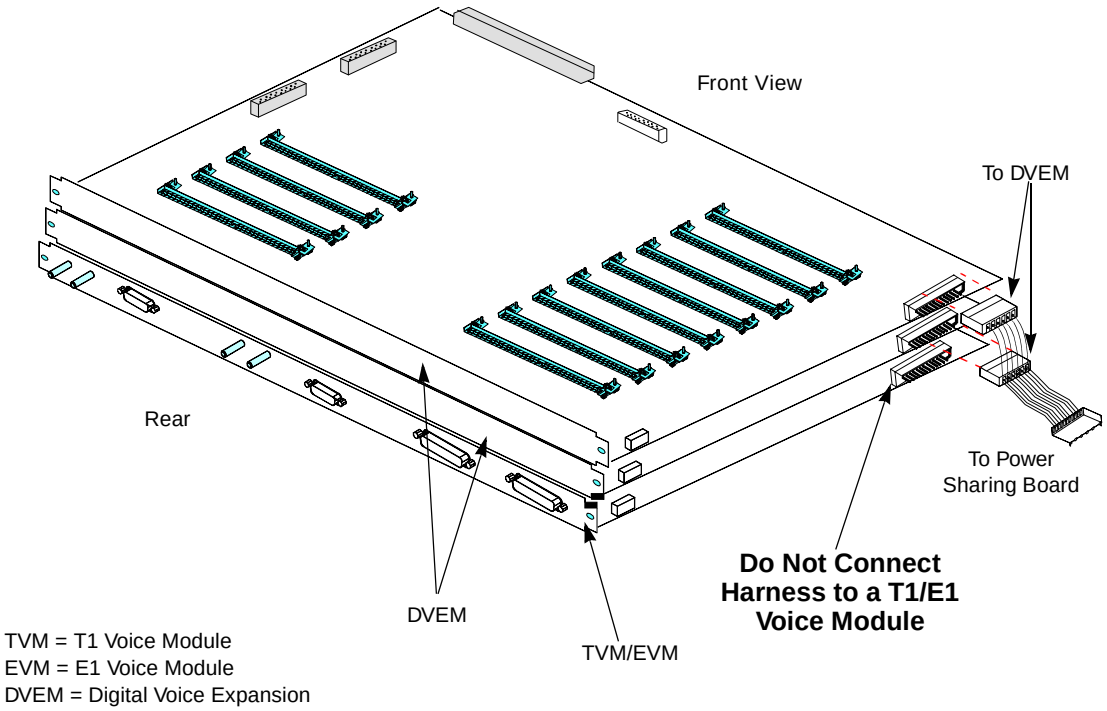


Figure 5-12. DVEM Power Harness

Digital Voice Module

Digital Voice Module (DVM - NTAU60AA) is a daughterboards that fit into a slot on top of the T1/E1 Voice Module or the Digital Voice Expansion Module. It is often referred to as a single in-line memory module (SIMM). Along with providing a second bank of flash memory, the Digital Voice Module has a Real Time Clock (RTC) which maintains network time and date and is synchronized with the integrated network.

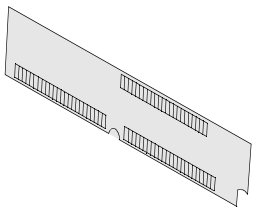


Figure 5-13. Digital Voice Module

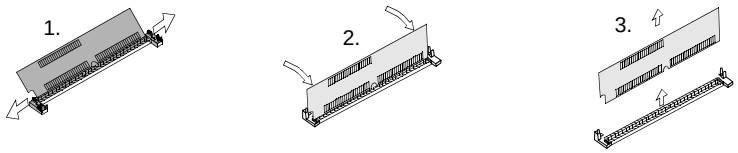
Each Digital Voice Module provides one digital voice channel that the T1/E1 Module supports. It compresses 64 Kb/s of pulse code modulation digitized voice obtained from the DSX-1/L1 interface into low-speed channels, thereby optimizing the use of the available bandwidths.

- Up to six may be installed in a T1/E1 Voice Module
- Up to 12 may be installed in Digital Voice Expansion Module

Removing Daughterboards

Follow the procedure below to remove or exchange a Digital Voice Module or any other daughterboard (SIMM).

1. Gently push out the connector locking flanges located at each side of the slot housing the daughterboard.
2. Move the daughterboard to a vertical position.
3. Lift up the daughterboard.

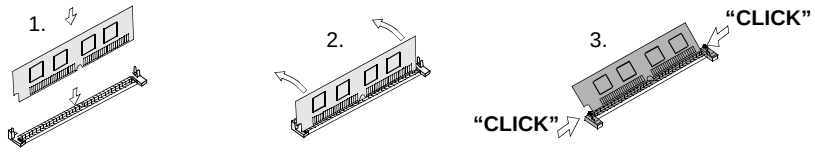


Installing Daughterboards

Follow the procedure below to install or replace a Digital Voice Module or any other daughterboard (SIMM) in the Passport unit.

> ⚠ ***Warning:*** Do not attempt to remove or install a Digital Voice Module or any daughterboard (SIMM) while power is connected to the Passport unit. Be sure to disconnect the unit from the power source.

1. Insert the daughterboard into the connector.
2. Gently push down and the back on the daughterboard.
3. The daughterboard will “click” into the connector locking flanges.



ISDN BRI Voice Module

The ISDN BRI Voice Module (IVM-BRI/ST/2 - NTAU76CA) provides the Passport 4400 unit with ISDN interface for connection to an ISDN PBX, ISDN phone, or other ISDN protocol and provides external clocking capability.

Note: The previous release of the modules (NTAU76AA and NTAU76BA) did not provide the BRI clock sync module for external clocking.

Attention:

The ISDN BRI Voice Module will not operate with the Passport 4455. It is used only with the Passport 4430 and Passport 4450.

The NTAU76CA requires Ethernet Base Module NTAU01CA Rev. 05, or later.

With a Passport 4450, if the ISDN BRI Voice Module is in the top slot (E), you must use Rev. 03 or later.

The BRI module connects to the trunk side of an ISDN PBX, serving as one half of an ISDN tie trunk that connects two ISDN PBXs.

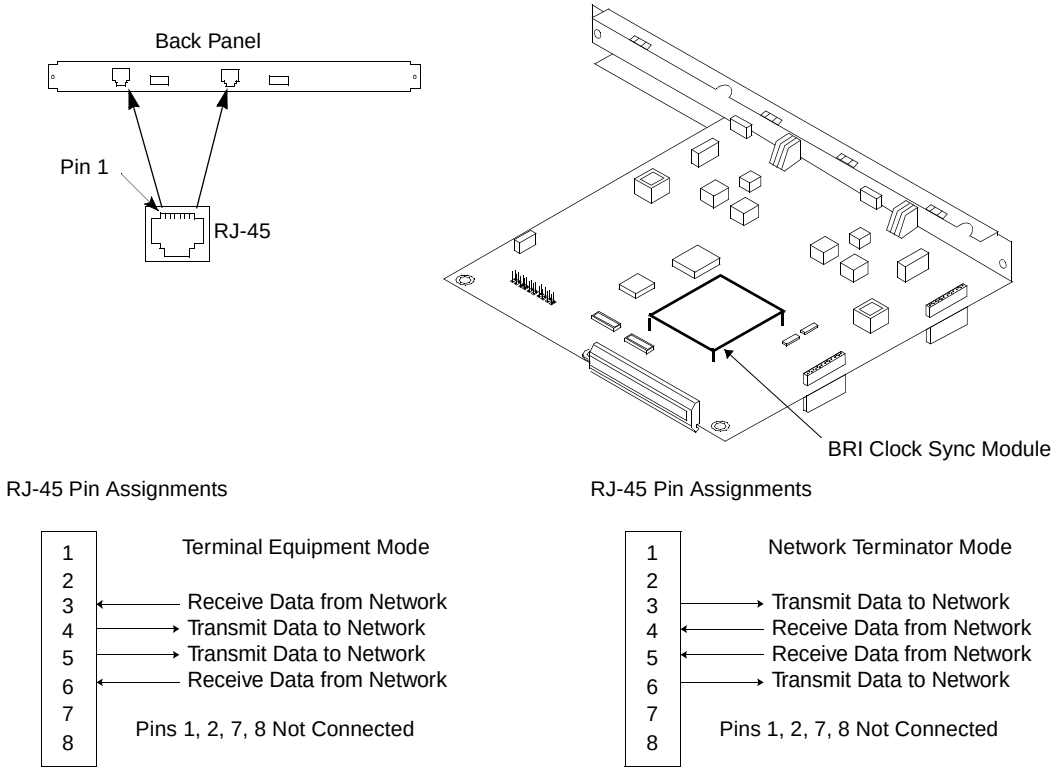


Figure 5-14. ISDN BRI Voice Module (S/T) and Pin Assignments

To ensure that your unit is equipped with the External Synchronization feature, check the part number tag on the face plate of the Ethernet Base Module. All units shipped from the factory after January 2000 to non-North American locations will have this modification. The tag should read NTAU01CA Revision level 05 (or higher). If there is any doubt about the unit you have, contact Nortel Networks Customer Service and refer to ECO E400399. They will let you know if the revision level of your unit includes the necessary features.

Note: If this module is installed in a unit that does not have a wiring change, it will revert to its internal clock and otherwise perform all other functions.

Note: The connections will depend on the specific site requirements. If you are not sure of the connections required for the Passport 4400 unit, consult your system administrator or refer to the following:

- Appendix A, Cable Diagrams.
- Appendix B, Agency and Telephone Company Requirements.

Analog Voice Modules 6

Analog Voice Modules convert analog voice obtained from telephone interfaces into digital form, and internally connect the converted voice to the Ethernet Base Module within the unit.

The following voice modules are discussed in this chapter:

- Analog Voice Module on page 6-3. FXS, FXO, and E&M interfaces are determined by changing the straps on the front of the module's circuit board.
  - — Single Channel (AVM/1 - NTAU61AA)
  - — Dual Channel (AVM/2 - NTAU62AA)
- Universal Analog Voice Module on page 6-6 (UAVM/2 - NTAU50AA) offers the following signaling formats:
  - — FXS and FXO Interface Modules on page 6-11 (VIM/FXS - NTAY09AA and VIM/FXO-E - NTLN23AA)
  - — E&M Interface Module on page 6-17 (VIM/E&M - NTAY09AA)
  - — Voice/Fax Switch Module on page 6-19

> ⚠ ***Caution:*** The interface module must not be inserted into, or removed from the unit, while the unit is operating. This could cause damage to the unit or cause interruption of network services or both.

Single and Dual Channel Models

Both the Analog Voice Module and Universal Analog Voice Module are available in single- and dual-channel models.

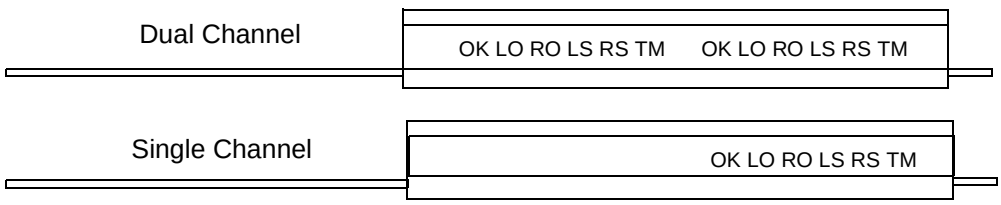


Figure 6-1. Front View and Indicators for Analog Voice Module and Universal Analog Voice Module

Signaling Formats

Use the information and figures below to ensure you are using the correct interfaces in your Analog Voice Modules.

FXS

- Provides ringing voltage and battery to the attached telephone equipment.
- Selected when the voice channel is connected directly to a telephone instrument, to the trunk side of a key telephone system, or to the central office trunk of a Private Branch Exchange (PBX).
- Must never be connected to a telephone interface that also provides ringing voltage, such as Central Office equipment, a PBX station, or off-premise circuit.

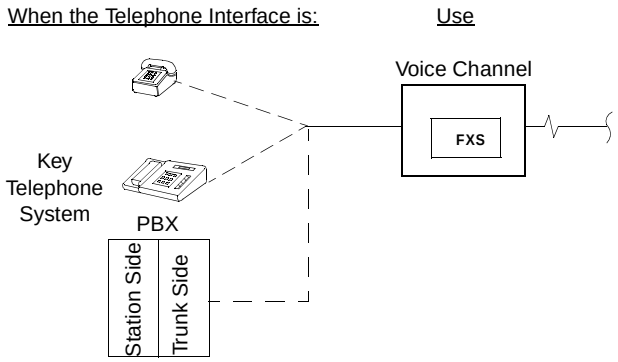


Figure 6-2. Interface Requirements for FXS

FXO

- Normally attaches to the station side of a PBX or Central Office loop start equipment.
- Accepts ringing voltage from the attached Central Office line of PBX but does not provide ringing voltage or battery.

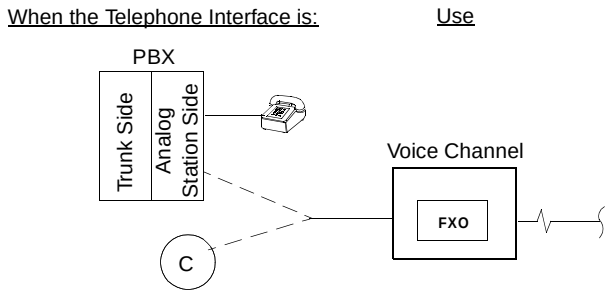


Figure 6-3. Interface Requirements for FXO

E&M

- Used in a tie-trunk environment, when the voice channel is connected to the trunk circuit of a PBX.
- It may be strapped one of three ways to select one of three E&M formats (Types I, II/IV, or V).

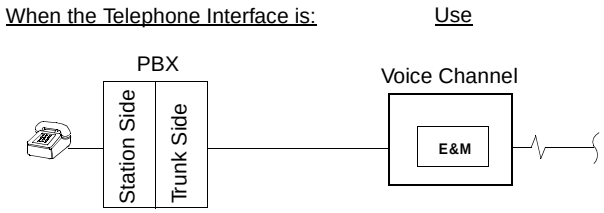


Figure 6-4. Interface Requirements for E&M

Analog Voice Module

The Analog Voice Module converts analog signals to digital for processing by the Passport 4400 unit. FXS, FXO and E&M interfaces are determined by changing the straps on the front of the module's circuit board.

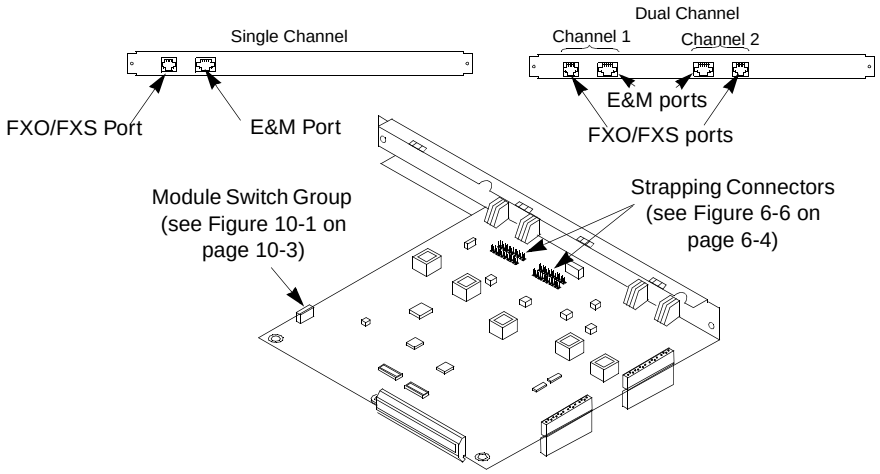


Figure 6-5. Rear View of Analog Voice Module

> ⚠ ***Caution:*** When using the RJ-48C cable (NTMU88AA) supplied with the Analog Voice Module, pin 1 (SB) has live -44 volts dc on it. If not used (such as in FXO or E&M Type I connections), make sure that pin 1 (blue SB) lead is cut off and insulated.

Note: When an FXO voice channel is to be connected to the Public Switched Telephone Network, you must use the modular connectors and the supplied modular cable(s).

Strapping

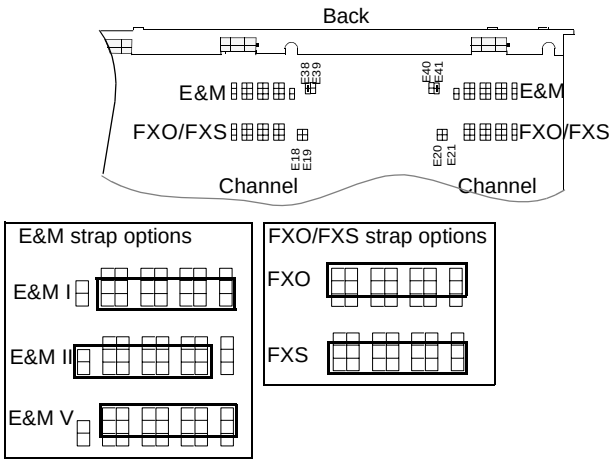
Strapping involves matching the voice/fax channel with the attached telephone interface. Specifically, the voice/fax channel may be strapped, depending on the application, for one of three common types of signaling conventions: FXS (Foreign Exchange Station), FXO (Foreign Exchange Office), or E&M (Ear and Mouth).

Analog Voice Modules installed in units are usually prestrapped to the interface type specified in the order. Restrap only if you add a new Analog Voice Module, if your interface requirements change, or if your interface requirements are different from the way you ordered them. You may also need to temporarily restrap a voice/fax module if you perform a level setting procedure. To verify the settings of your voice/fax channel(s) without physically inspecting them, refer to Configuring and Operating Passport 4400, 800-2002-40, on-line documentation.

The following supports Analog Voice Strapping in a dual-channel Analog Voice Module. Each channel may be strapped for a different signaling convention:

- Place a strap over E41 (or E38 for Channel 2) if the cable to the PBX is too long
- Place a strap over E21 (or E18 for Channel 2) to connect the battery ground to the SG lead
- To select E&M, FXO, or FXS for each channel, consult the Analog Voice Module strap options shown in Figure 6-6 below.

Note: When strapped for E&M, if the Analog Voice Module is not properly connected to the PBX, you will hear “dead air” over the handset instead of a fast busy or other call request denial indication.



Note: Channels 1 and 2 have the same strap options, but the straps for Channel 2 are arranged in the opposite direction (mirrored left/right in the diagram above).

Figure 6-6. Location of Analog Voice Module Straps

Attaching Cables to the Analog Voice Module

The connections will depend on the specific site requirements. If you are not sure of the exact connections required for the Passport 4400 unit you are installing, consult your system administrator.

- If your site requires an E&M connection, use an RJ-48C cable to connect the Passport 4400 unit to a PBX. The strapping assignments for both 2-wire and 4-wire cables are shown in Figure 6-20 on page 6-18.

  Note: Refer to Appendix E, PBX Interface Connection Diagrams for circuit connection information regarding connecting an E&M voice channel to a PBX.

- If your site requires an FXS or FXO connection, use an RJ-11 cable to connect the Passport 4400 unit to a telephone set or wall jack.

Refer to Appendix A, Cable Diagrams, for further information about cables.

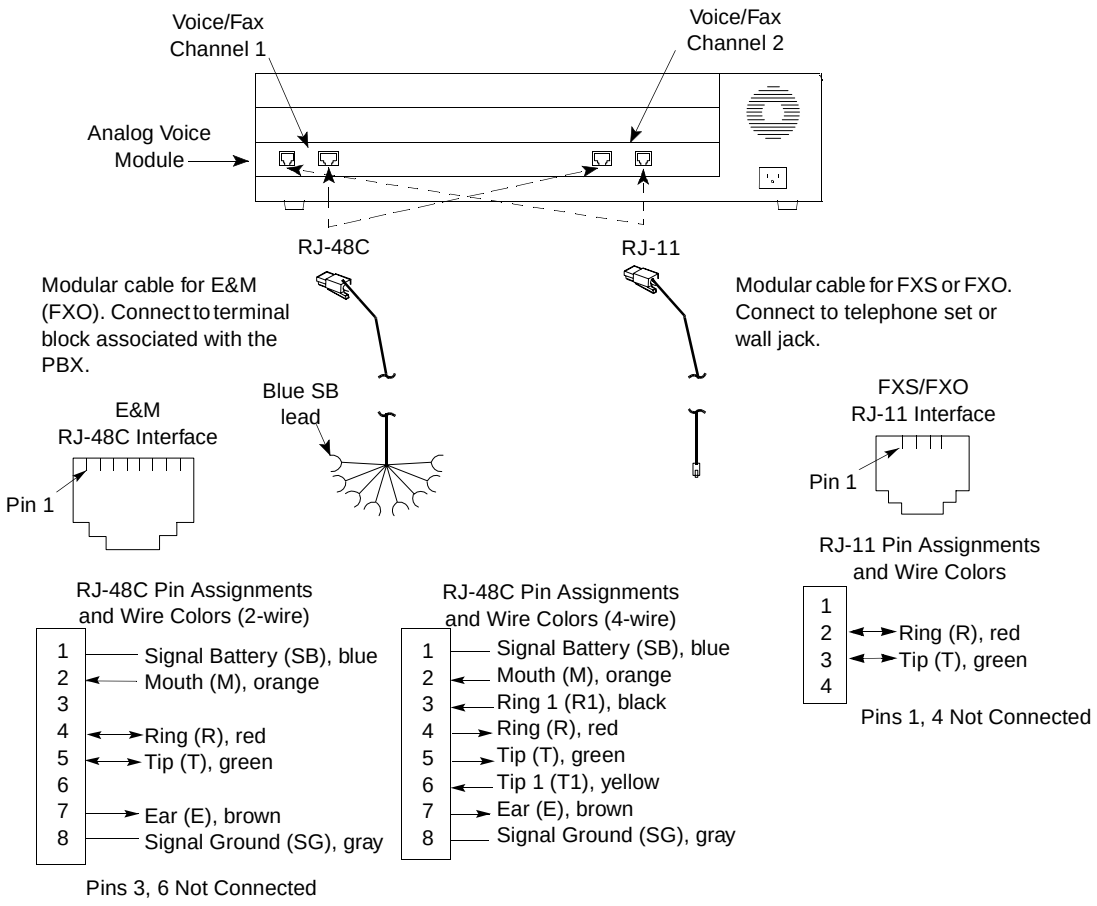

Voice/Fax Channel 1
Voice/Fax Channel 2
Analog Voice Module
RJ-48C
RJ-11
Modular cable for E&M (FXO). Connect to terminal block associated with the PBX.
Modular cable for FXS or FXO. Connect to telephone set or wall jack.
Blue SB lead
E&M RJ-48C Interface
Pin 1
FXS/FXO RJ-11 Interface
Pin 1
RJ-11 Pin Assignments and Wire Colors
1
2 Ring (R), red
3 Tip (T), green
4
Pins 1, 4 Not Connected
RJ-48C Pin Assignments and Wire Colors (2-wire)
1 Signal Battery (SB), blue
2 Mouth (M), orange
3
4 Ring (R), red
5 Tip (T), green
6
7 Ear (E), brown
8 Signal Ground (SG), gray
Pins 3, 6 Not Connected
RJ-48C Pin Assignments and Wire Colors (4-wire)
1 Signal Battery (SB), blue
2 Mouth (M), orange
3 Ring 1 (R1), black
4 Ring (R), red
5 Tip (T), green
6 Tip 1 (T1), yellow
7 Ear (E), brown
8 Signal Ground (SG), gray

Figure 6-7. Telephone Interface Cable Connections

Universal Analog Voice Module

The Universal Analog Voice Module (UAVM) consists of two channels into which one of the four voice interface modules (E&M, FXO, FXS, or Voice/Fax Switch module), is inserted. The Universal Analog Voice Module must be configured with the correct jumper settings for the types of interface modules you plan to use before you can connect the modules to the network. Voice interface modules can be connected with either RJ-11 modular cables or with a direct connection to a terminal block.

The Universal Analog Voice Module consists of a motherboard and one or two interface modules (see Figure 6-9 below).

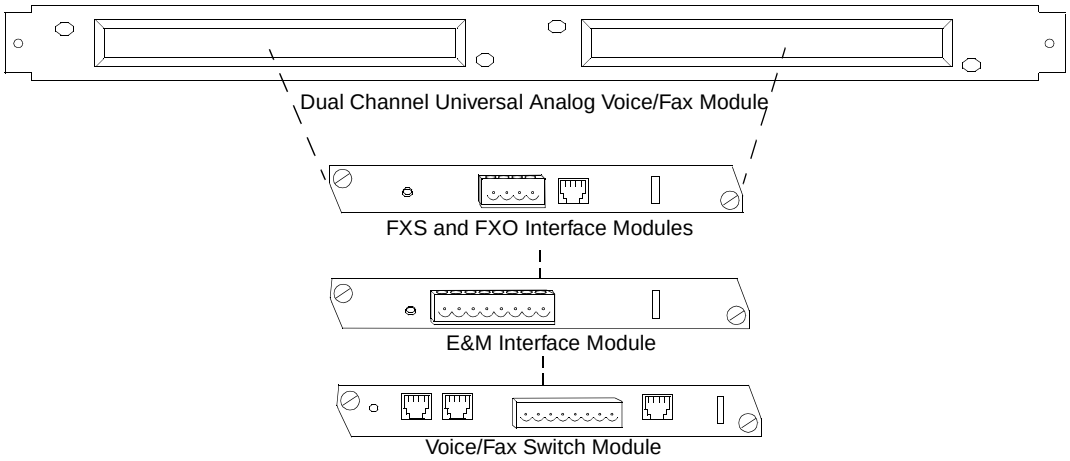

Dual Channel Universal Analog Voice/Fax Module
FXS and FXO Interface Modules
E&M Interface Module
Voice/Fax Switch Module

Figure 6-8. Rear View of Universal Analog Voice Module

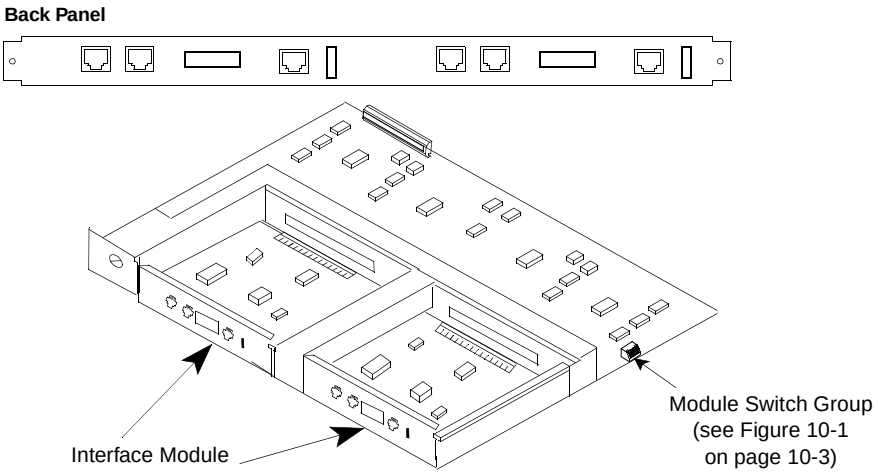


Figure 6-9. Universal Analog Voice Module with Two Interface Modules Installed

Interface Modules

Interface modules are voice modules inserted in the slots provided on a Universal Analog Voice Module supporting FXS, FXO, E&M and Voice/Fax Switch modules. The type of interface module selected will depend on the signaling required (see page 6-2).

Removing an Interface Module

> ⚠ ***Caution:*** The interface module must not be inserted into, or removed from the unit, while the unit is operating. This could cause damage to the unit or cause interruption of network services or both.

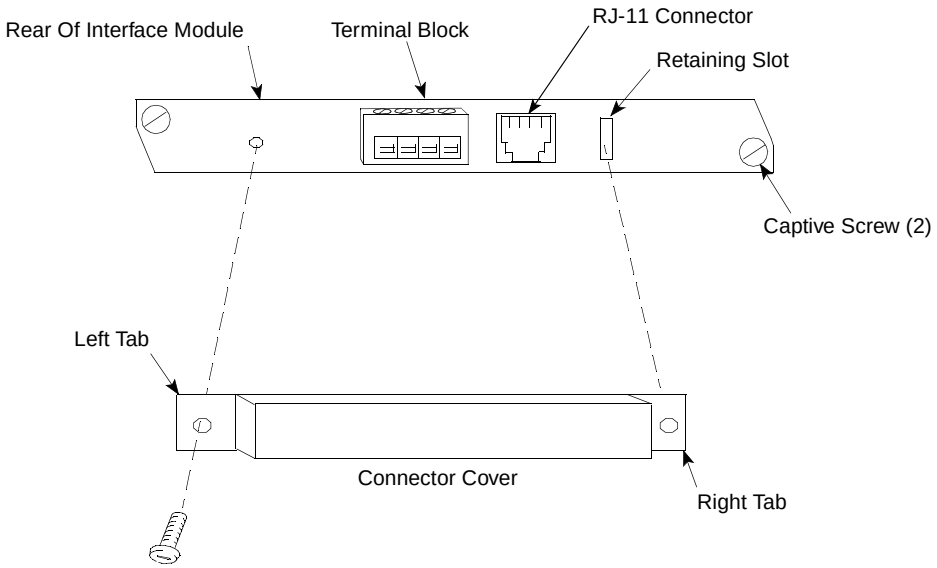


Figure 6-10. Removing the Connector Cover

1. Facing the rear of the voice/fax module, remove the screw on the left side of the connector cover with the Phillips screwdriver (see Figure 6-10 above).
2. Unhinge the right tab from the slot on the right side of the interface module, then remove the connector cover. Save the screw.
3. Disconnect any modular cables from the RJ-11 connectors or unplug the terminal block from the interface.
4. Unscrew the two spring-loaded captive screws with the medium-sized, flathead screwdriver.
5. Grasp the interface module firmly and slide it slowly toward you until it is free of the Universal Analog Voice Module (see Figure 6-11 on page 6-8).

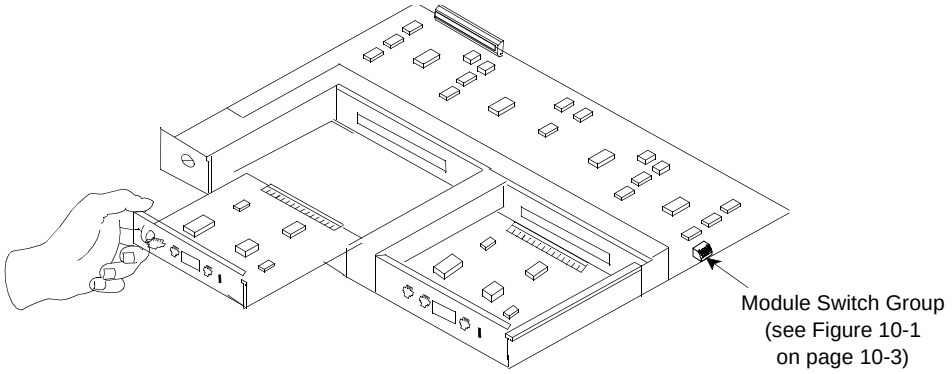


Figure 6-11. Removing/Inserting an Interface Module

Inserting an Interface Module

> ⚠ ***Caution:*** The interface module must not be inserted into, or removed from the unit, while the unit is operating. This could cause damage to the unit or cause interruption of network services or both.

1. Place the interface module within the channel.
2. Slide the module toward the rear of the device until it is firmly seated in its mating connector on the Universal Analog Voice Module.
3. Secure the interface module with the two spring-loaded captive screws (see Figure 6-10, on page 6-7).
4. Reconnect the modular cable to the RJ-11 connectors if required. Most FXS, FXO, and Voice/Fax Switch interface module applications use a modular cable to connect the voice/fax channel to the telephone equipment. Connect one end of the cable to the FXS/FXO/Voice/Fax Switch modular jack on the interface module and the other end to the telephone equipment.
5. Reconnect the cable to the terminal block if required. If you are connecting a telephone interface cable to the terminal block for the first time, see Figure 6-12 on page 6-10 for details. You will need the small flat-head screwdriver to secure the individual cable leads.
6. Replace the connector cover by inserting the right tab of the cover in the retaining slot of the interface module, then secure on the left side with the Phillips-head screw.

   Note: When an FXO voice channel is to be connected to the Public Switched Telephone Network, you must use the modular connectors and the supplied modular cable(s).

> ***Caution:*** When using the RJ-48C cable (NTMU88AA) supplied with the AVM, pin 1 (SB) on the lug end, has live -44 volts dc on it. If not used (such as in FXO or E&M Type I connections), make sure that the pin 1 (blue SB) lead is cut off and insulated with electrical tape to prevent contact with any object or equipment.

Use of Terminal Block

On FXS and FXO interface modules, the 4-pin terminal block is an alternate method of connection to the telephone interface equipment (see Figure 6-12 on page 6-10). The FXS and FXO interface modules provide a direct connection to the common signal ground (SG) of the line power.

On E&M interface modules, the 8-pin terminal block is the only method of connection to the telephone interface equipment; there is no modular jack (see Figure 6-12 on page 6-10).

On Voice/Fax Switch modules, installation may be suitable for modular connections. Use the three modular cables to make your connections to the telephone, FAX, and PSTN interfaces. After the connections are made, install the connector cover.

Note: When an FXO voice channel is to be connected to the Public Switched Telephone Network (PSTN), you must use the modular connectors and the supplied modular cable(s)

> ***Caution:*** Wiring to the tie trunk terminal block should be carried out by a qualified technician. Wires used for this purpose must be UL type CM, 22/24 AWG, 8-conductor.

Terminal Block Connection

Refer to Figure 6-12 on page 6-10 for reference while connecting the terminal block.

1. Remove the plug from the terminal block.
2. Use a cable (not supplied) with bare-wire leads. Insert each cable lead into the cutout at the front of the plug and secure it with a small flathead screwdriver at the top. It is recommended that the cable leads be color coded for easy identification.
3. Insert the plug that now includes the cable leads in the terminal block.
4. After the connection is made, install the connector cover by inserting the right tab of the cover in the retaining slot of the interface module back panel. Secure on the left side with a Phillips-head screw.

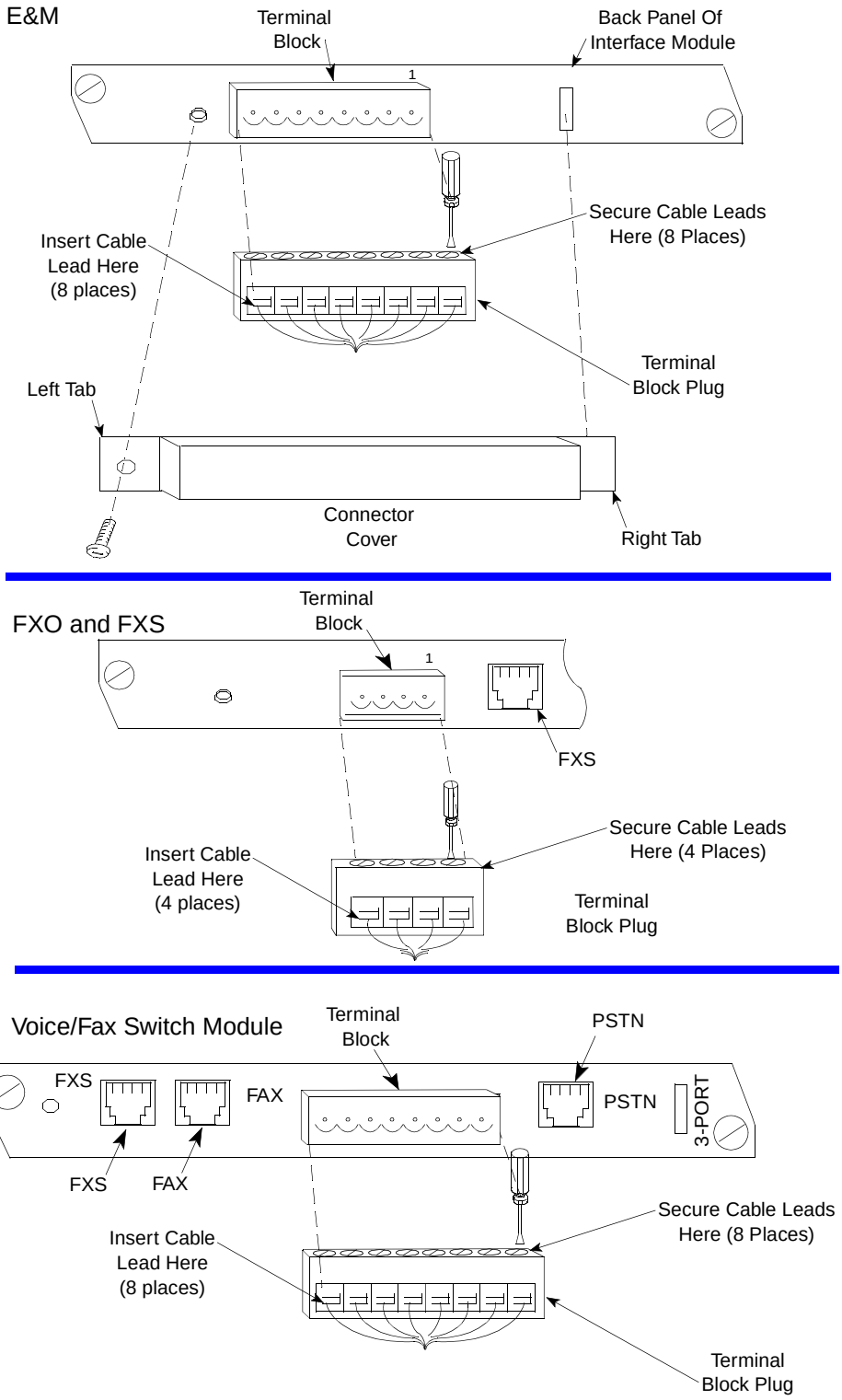


Figure 6-12. Terminal Block Cable Connections

FXS and FXO Interface Modules

Except for the type designation, the FXS and FXO interface modules have identical telephone interface connectors on the back panel. Each consists of an RJ-11 modular jack labeled FXS or FXO and a 4-pin terminal block; see Figure 6-13 below. Both are shielded by a protective cover.

> ***Caution:*** The interface module must not be inserted into, or removed from the unit, while the unit is operating. This could cause damage to the unit or cause interruption of network services or both.

The terminal block is fitted with a female plug. Individual cable leads are connected to this plug to form a telephone interface cable.

Refer to Figure 6-10 on page 6-7 for more information.

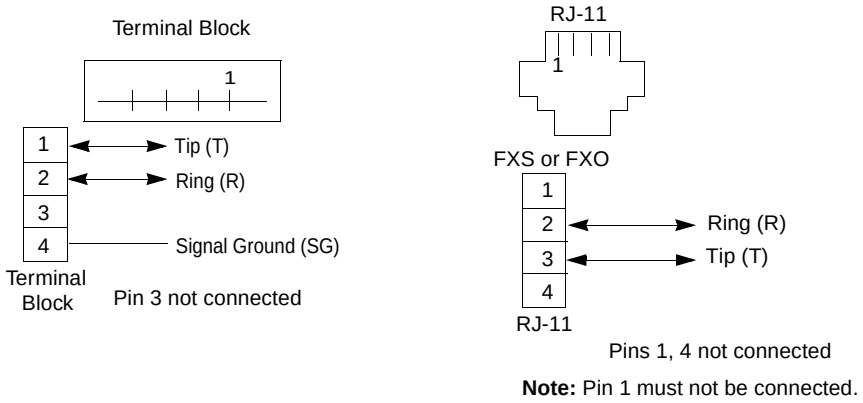


Figure 6-13. FXS and FXO Interface Modules

FXS Interface Strapping

There are a total of six movable straps located on the FXS interface module, E1 through E6. These straps are reserved for factory use only. They must not be altered by the user.

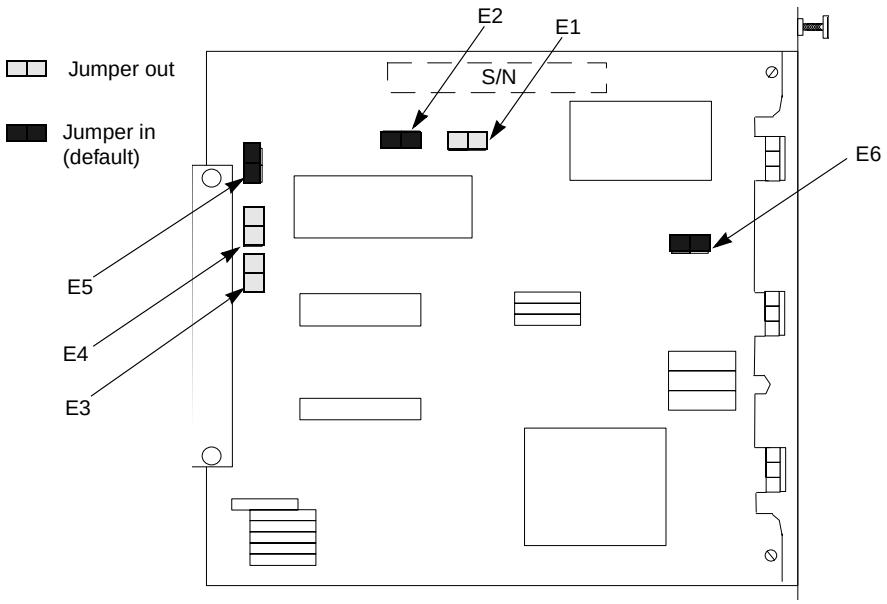


Figure 6-14. Location of Straps on the FXS Interface Module

FXO Interface Strapping

The FXO interface is designed to meet regulatory agency requirements unique to selected countries (such as Spain, France, and Germany). This module contains special straps that implement the requirements of each country.

There are 13 movable straps located on the FXO interface module, E1 through E13. The following four figures show the locations of these straps. The straps function as follows:

- Straps E1 through E5 are reserved for factory use only. They must not be altered by the user
- Five different strapblocks (E6/E7, E8/E9, E10/E11, E13/E14, and E15/E16) are used to select the country of operation (see Figure 6-16, Figure 6-17, and Figure 6-18)
- Strap E12 is reserved for factory use only. It must not be altered by the user

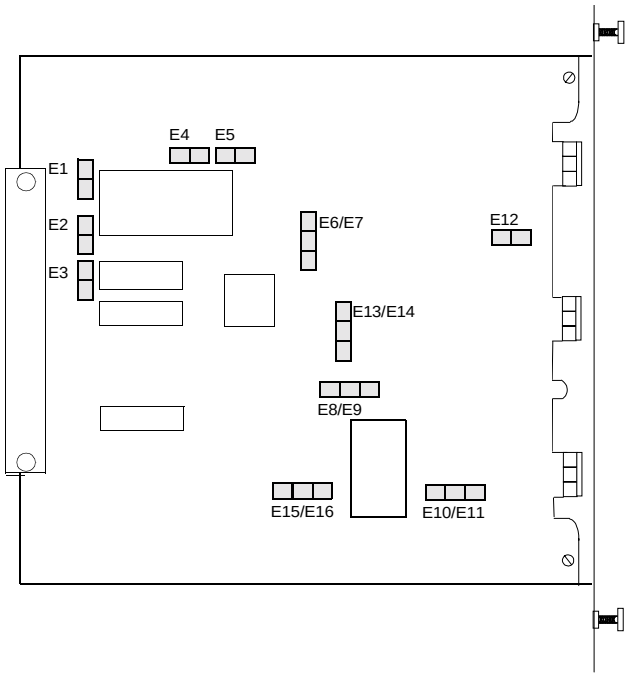


Figure 6-15. Location of straps, FXO Interface Module

Country-specific Strap Settings

> ***Caution:*** The following figures give specific instructions on strapping the FXO Interface Module for use in Spain, France, Germany and Switzerland. The module is factory shipped with a default setting that operates correctly in all other countries. If this module is NOT to be used in one of the countries listed above, do not adjust the straps.

France

- Locate the strapping block labeled E6/E7. Place the strap over the pins marked E6
- Locate the strapping block labeled E13/E14. Place the strap over the pins marked E13
- Leave other strapping blocks (E8/E9, E10/E11, E15/E16) in their default positions

Figure 6-16. Strapping the European FXO Module — France

Spain

- Locate the strapping block labeled E8/E9. Place the strap over the pins marked E8
- Locate the strapping block labeled E10/E11. Place the strap over the pins marked E11
- Leave other strapping blocks (E6/E7, E13/E14, E15/E16) in their default positions

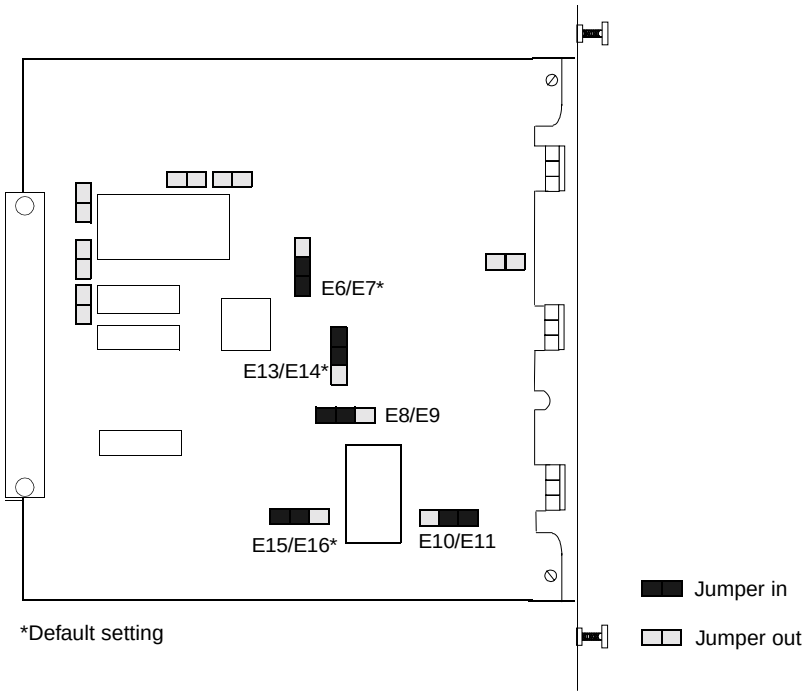


Figure 6-17. Strapping the European FXO Module — Spain

Germany and Switzerland

Locate the strapping block labeled E15/E16. Place the strap over the pins marked E15. Leave other strapping blocks (E6/E7, E8/E9, E10/E11, E13/E14) in their default positions.

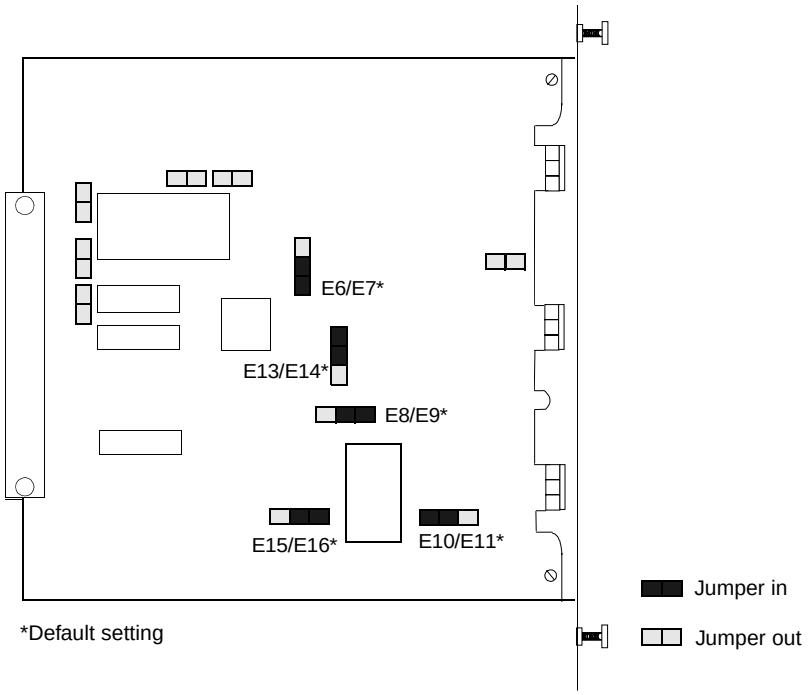


Figure 6-18. Strapping the European FXO Module — Germany and Switzerland

E&M Interface Module

The E&M Interface Module telephone interface signals are terminated in an 8-pin tie trunk terminal block on the back panel (see Figure 6-19 below). This connector is fitted with a female plug. Individual cable leads are connected to this plug to form a telephone interface cable.

Note: If the E&M interface module is not properly connected to the PBX, you will hear “dead air” over the handset instead of a fast busy or other call request denial indication.

> ***Caution:*** The interface module must not be inserted into, or removed from the unit, while the unit is operating. This could cause damage to the unit or cause interruption of network services or both.

Refer to Appendix E, PBX Interface Connection Diagrams for circuit connection information regarding connecting an E&M voice channel to a PBX.

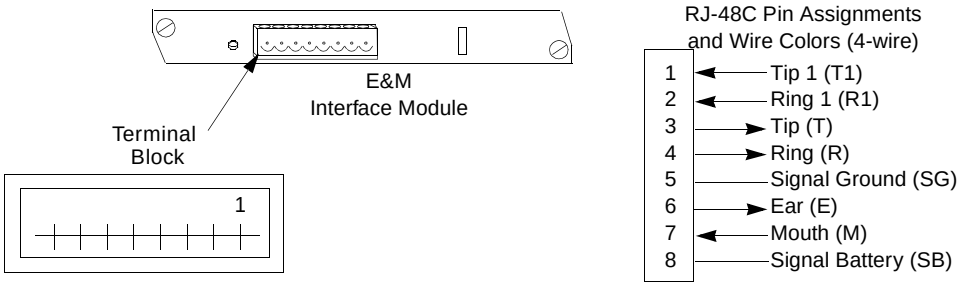


Figure 6-19. E&M Interface Module, Back Panel Connector

E&M Strapping

There are a total of 22 straps on the E&M interface module (see Figure 6-20, on page 6-18). Their functions are as follows:

Strap Number	Description
E1 through E5	Reserved for factory use only. They must not be altered by the user.
E6, E7, and E9 through E13.	Used to select signaling types I, II, and V. Refer to Appendix C for more information on signaling types I, II, and V.
E8 and E17	Normally installed to shunt out DC blocking capacitors C36 and C38. They must be removed in case there are DC voltages present in the R and R1 leads.
E14	Used to shunt out the series resistor in the E lead in case the loop resistance is too high to trip the detector inside the PBX. If cabling is short, try removing the strap.
E15	Used for dial pulse correction; it connects a 1-μf filter capacitor between the SG lead and ground.

Strap Number	Description
E1 through E5	Reserved for factory use only. They must not be altered by the user.
E16	Used to shut out the series resistor in the SB lead in case the loop resistance is too high to trip the detector inside the interface module. If cabling is short, try with the strap removed.
E18 and E19	Reserved for factory use only. They must not be altered by the user.
E20, E21, and E22	Spares.

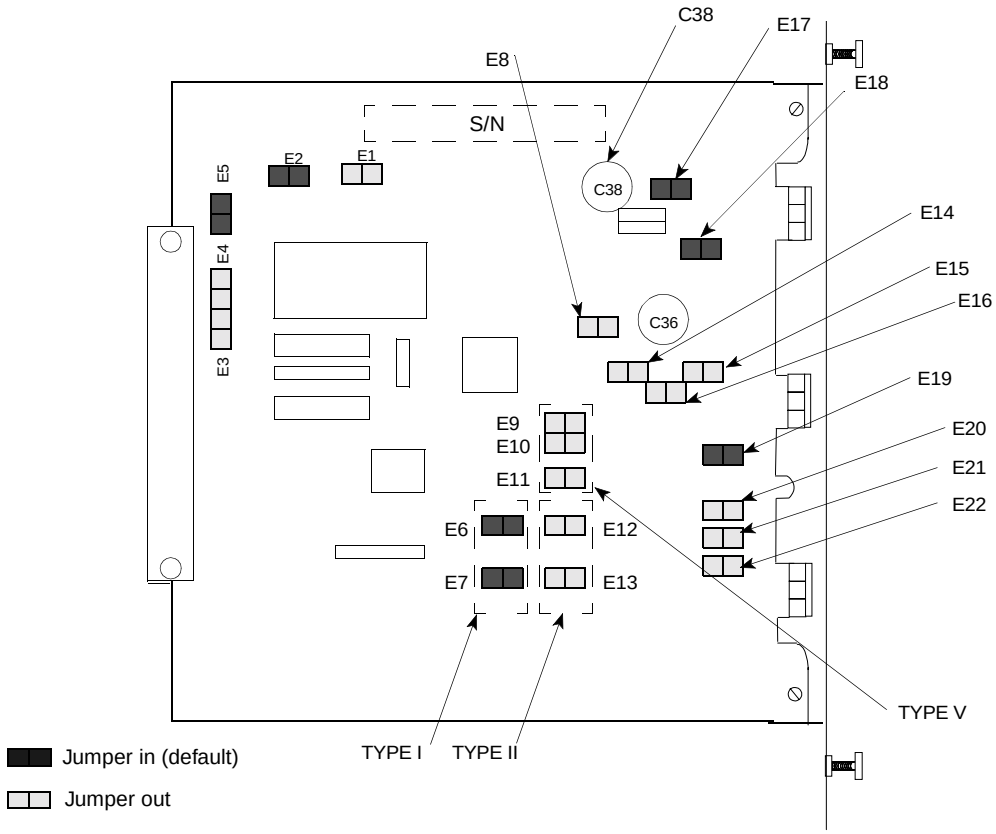


Figure 6-20. Location of Straps, E&M Interface Module

Voice/Fax Switch Module

There are four interface connectors available on the back panel of the Voice/Fax Switch Module (NTAU52AA), as shown in Figure 6-21 below. Three are modular RJ-11 jacks labelled FXS, FAX, and PSTN, respectively. The fourth is an 8-pin terminal block.

> ⚠ ***Caution:*** Voice/Fax Switch interface straps are preset at the factory to match the memory installed and must **not** be altered by the user

Where possible, use the modular jacks to make your FXS/FAX/PSTN interface connections; cables are supplied.

> ⚠ ***Caution:*** The interface module must not be inserted into, or removed from the unit, while the unit is operating. This could cause damage to the unit or cause interruption of network services or both.

If your installation is not suited for modular connection, the terminal block is an alternate choice. Use a color-coded cable (not supplied) to make your connection (see Figure 6-12 on page 6-10).

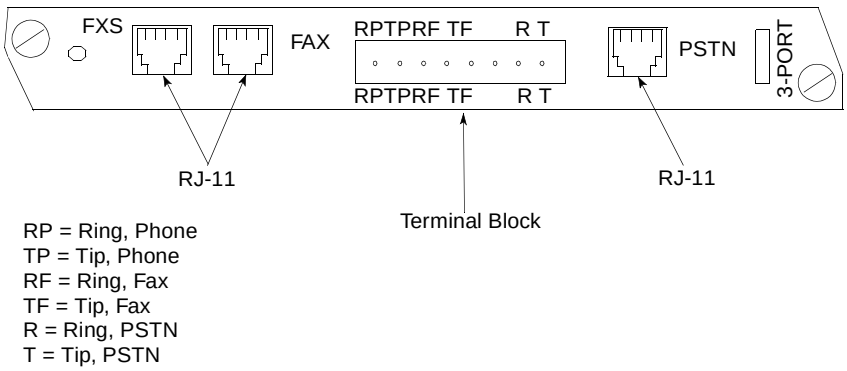


Figure 6-21. Voice/Fax Switch Module Cable Connections

Figure 6-22 is a wiring diagram of the interface connectors. Note that the 8-pin terminal block is connected in parallel with the three modular RJ-11 connectors (pins 3 and 4 are not used).

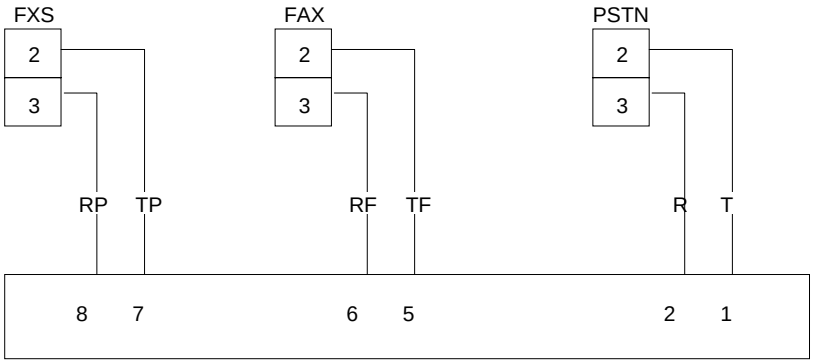


Figure 6-22. Interface Connection Wiring Diagram

Strapping and PROM Orientation

There are a total of five movable straps located on the Voice/Fax Switch Module, E1 through E5. These straps are preset at the factory to match the type of memory installed. These straps must not be altered by the user.

> ⚠ ***Caution:*** PROM U2 must be oriented as shown in Figure 6-23, with the notch facing connector P1. Otherwise, it may result in damage to the PROM.

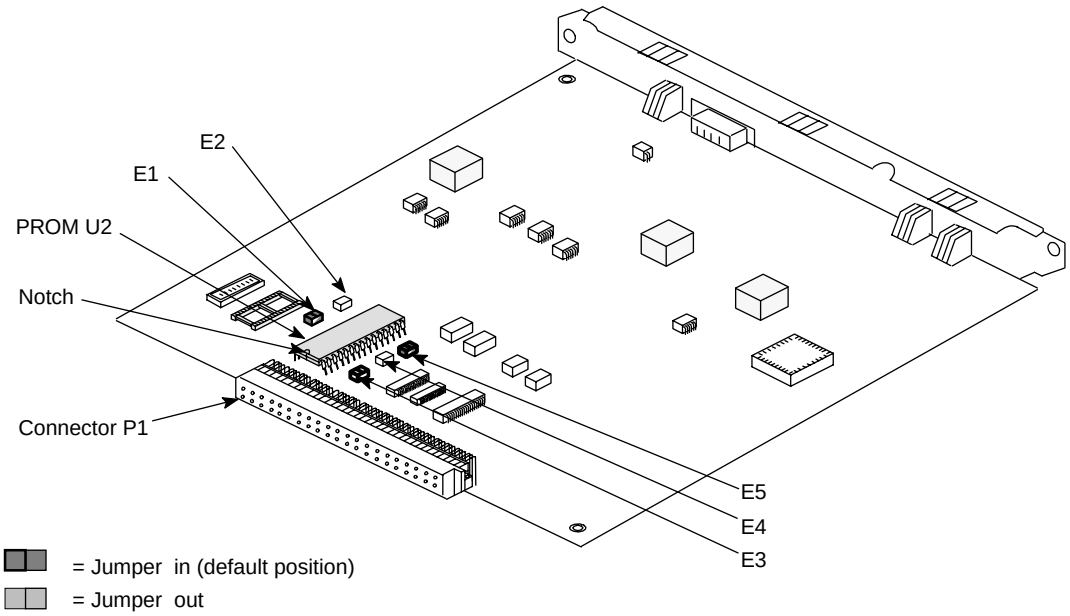


Figure 6-23. Location of Straps and PROM on Voice/Fax Switch Module

Interface Modules (WAN) 7

Interface Modules are WAN modules specifically designed to enhance the WAN capabilities of the unit. This chapter describes the following interface modules supported on the Ethernet Base Module:

- WAN Serial Interface Module on page 7-2
- 56 kbps CSU/DSU Interface Module on page 7-2
- T1 CSU/DSU Interface Module on page 7-3
- E1 CSU/DSU Interface Module on page 7-4
- ISDN TA U Interface Module on page 7-6
- ISDN TA S/T Interface Module on page 7-7

> ⚠ ***Caution:*** The interface module must not be inserted into, or removed from the unit, while the unit is operating. This could cause damage to the unit or cause interruption of network services or both.

Installing an Interface Module

1. Slide the interface module gently into the slot labeled Port 2 or Port 3 on the lower left end of the Ethernet Base Module back panel. Make sure the component side of the module is down.
2. Ensure that the module is pushed all the way in so it mates with the connector at the back of the slot.
3. Secure the module with the two Phillips screws supplied.

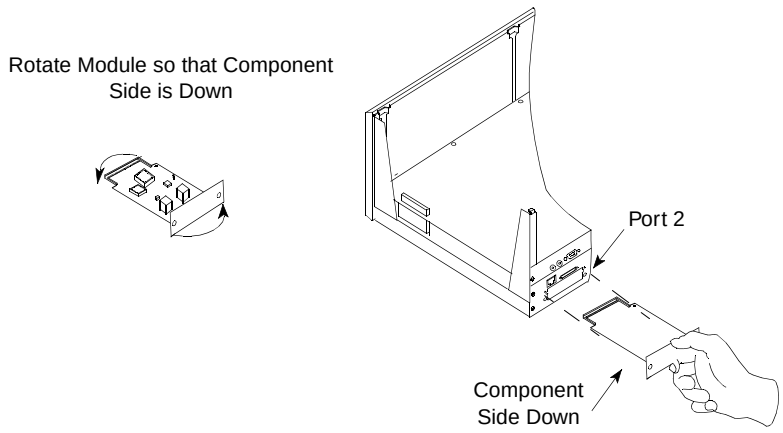


Figure 7-1. Installing an Interface Module

WAN Serial Interface Module

The WAN Serial Interface Module (NTAU03AA) provides additional port capability, identical to Port 1 on the base module. The module supports RS-232/ V.24, V.35, V.36, and X.21 interfaces, determined by the cable used. The module can support both DTE and DCE modes.The WAN serial interface module can be placed in Port 2 or Port 3.

The interface module must be inserted into the unit with the component side facing down.

For pin assignments, see Figure 3-5 on page 3-5.

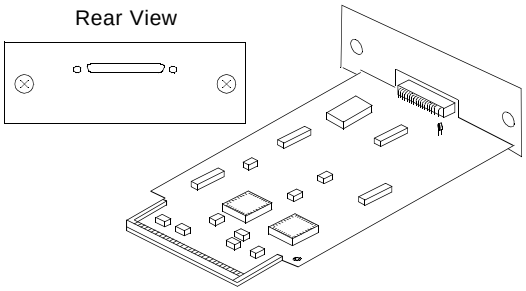


Figure 7-2. 3/4 and Back View of the WAN Serial Interface Module

56 kbps CSU/DSU Interface Module

The 56 kbps CSU/DSU Interface Module (NTAU02AA) supports the Dataphone Digital Service (DDS) without the secondary signaling channel.

> **Note:** Refer to Appendix B, Regulatory and Telephone Company Requirements for agency and telephone company requirements.

This interface module supports the following loopback modes:

- DSU loopback
- CSU loopback
- Digital loopback
- Local loopback
- Local loopback transmit end (LLT)
- Local loopback receive end (LLR).

Both Port 2 and Port 3 can support the 56 kbps CSU/DSU interface module.

The interface module must be inserted into the unit with the component side facing down.

An 8-position RJ-48C jack is provided to interface with the Dataphone Digital Service network.

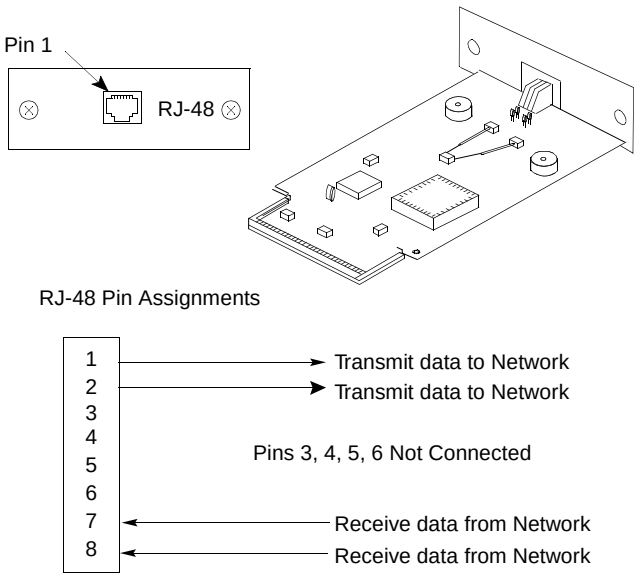


Figure 7-3. 56kbps CSU/DSU Interface Module, Connector, and Pin Assignments

T1 CSU/DSU Interface Module

The T1 CSU/DSU Interface Module (NTAU04AA) provides a direct T1 or fractional T1 (DSU/CSU) connection to a local digital PBX, a DS-1 interface to T1 network services, or any other compatible device. The T1 connection provides a larger communication bandwidth than the serial connection.

Note: Refer to Appendix B, Regulatory and Telephone Company Requirements for agency and telephone company requirements.

The T1 CSU/DSU Interface Module can be placed in Port 2 or Port 3.

The interface module must be inserted into the unit with the component side facing down.

Note: A T1 Access Voice module interface is also available for use in Passport 4400 units. Refer to Chapter 5, T1, E1, and Digital Voice Modules, of this manual for information about the T1 Access Voice module.

An 8-pin RJ-48C jack is provided to interface with the T1 network.

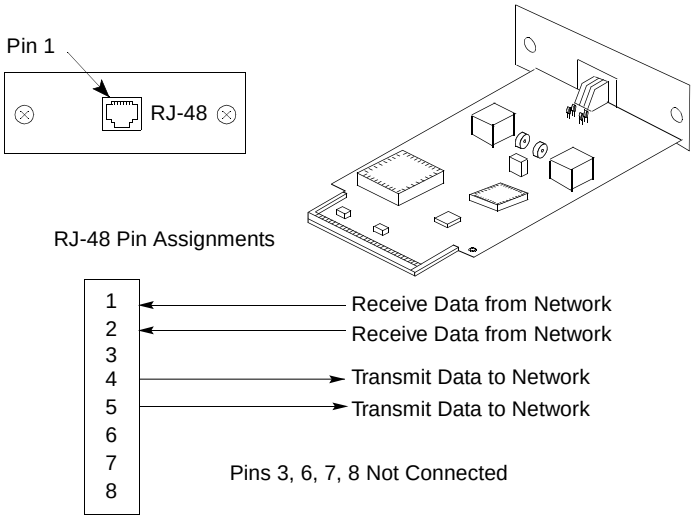


Figure 7-4. T1 CSU/DSU Interface Module, Connector, and Pin Assignments

E1 CSU/DSU Interface Module

An E1 CSU/DSU Interface Module provides a direct E1 or fractional E1 connection to a Passport E1 Function Processor, or any other compatible device. This E1 connection provides a larger communication bandwidth than the serial connection.

There are two models of E1 CSU/DSU Interface Modules available:

- The E1 CSU/DSU for120 ohms (NTAU96AA)
- The E1 CSU/DSU for 75 ohms (NTAU97AA)

Both Port 2 and Port 3 can support either E1 CSU/DSU module.

Note: Determining the proper module to use (75 ohms/120 ohms) will depend on the network requirements of the location of the Passport 4400.

E1 CSU/DSU Interface Module (120 ohms)

The interface module must be inserted into the unit with the component side facing down.

An 8-pin RJ-48C jack is provided to interface with the E1 network.

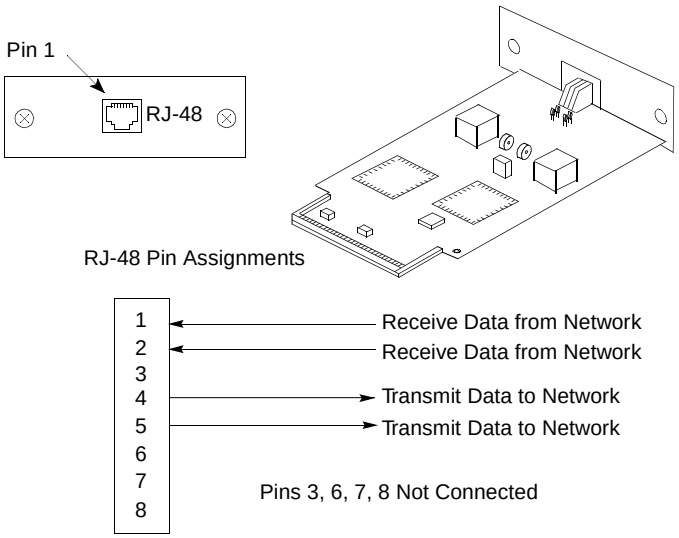


Figure 7-5. E1 CSU/DSU Interface Module, Connector, and Pin Assignments (120 ohms)

E1 CSU/DSU Interface Module (75 ohms)

The interface module must be inserted into the unit with the component side facing down.

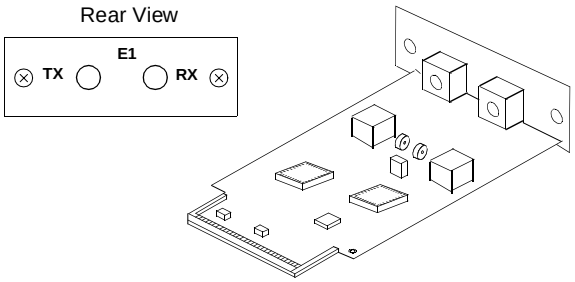


Figure 7-6. 3/4 and Back View of E1 CSU Interface Module (75 ohms)

ISDN TA Interface Modules

The ISDN (integrated services digital network) basic rate interface (BRI) plug-in modules will be used as primary network link connections to the WAN or for backup in case of failure. ISDN interface modules may be placed in both Port 2 and Port 3.

There are two types of ISDN TA interface modules:

- ISDN TA U Interface (NTAU05AA)
- ISDN TA S/T Interface (NTAU06AA)

Both are accessed via an RJ-45 connector.

The data frame of the ISDN interface consists of three data channels (D, B1, and B2). The D-channel is used to exchange control information between the user and the network, as well as transferring data, at a data rate of 16 Kb/s. Channels B1 and B2 are used to transfer data at the rate of 64 Kb/s.

ISDN TA U Interface Module

The interface module must be inserted into the unit with the component side facing down.

Note: Refer to Appendix B, Regulatory and Telephone Company Requirements for agency and telephone company requirements.

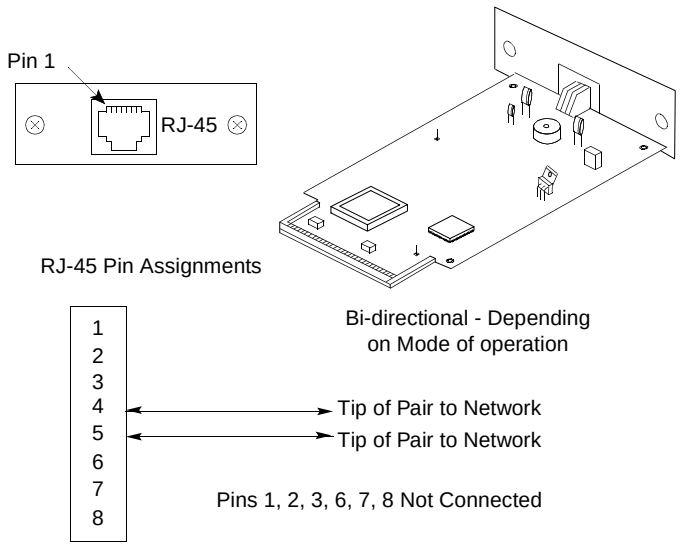


Figure 7-7. SDN TA U Interface Module, Connector, and Pin Assignments

ISDN TA S/T Interface Module

There are two user-adjustable straps on the ISDN TA S/T interface module, E3 and E4. These straps are used to configure the ISDN connection. Both straps are set to the factory default of OUT.

Note: Refer to Appendix B, Regulatory and Telephone Company Requirements for agency and telephone company requirements.

The following optional features are available for the ISDN TA S/T Interface Module:

- Setting strap E3 to IN adds a 100 ohm terminating resistor to the receiving channel
- Setting strap E4 to IN adds a 100 ohm terminating resistor to the transmitting channel

The interface module must be inserted into the unit with the component side facing down.

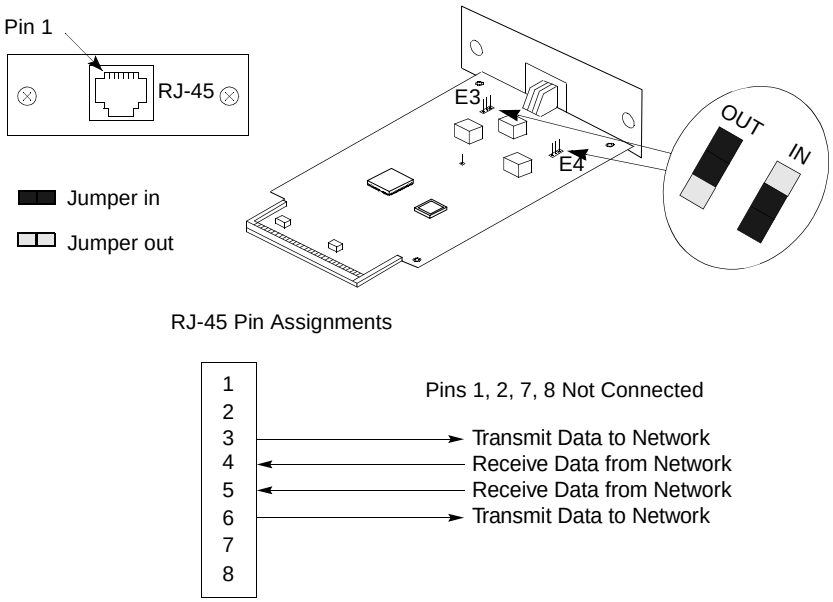


Figure 7-8. ISDN TA S/T Interface Module, Connector, and Pin Assignments

Indicators 8

This chapter describes the status indicator lights (LEDs) of the Passport 4400 (4430/4450/4455). The indicators can be seen through a series of small windows located at the front of the unit.

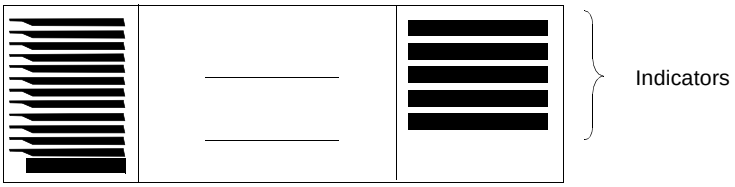


Figure 8-1. Location of Indicators on Passport 4400

The following status indicator lights are explained:

- Ethernet Base Module on page 8-1
- T1/E1 Voice Module on page 8-2
- Digital Voice Channel Status Indicators on page 8-3
- T1 and E1 Status Indicators on page 8-4
- Digital Voice Expansion Module on page 8-6
- Analog Voice Module and Universal Analog Voice Module on page 8-7
- ISDN BRI Voice Module on page 8-8

Ethernet Base Module

The bottom window contains the status indicators for the Ethernet Base Module, in addition to any serial interface modules that are installed. The functions and colors of the indicators vary according to the operation of the unit. See Table 8-1 on page 8-2 for a description of the indicator functions.

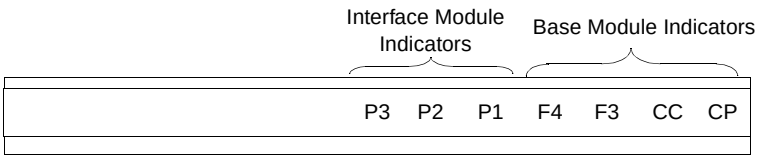


Figure 8-2. Ethernet Base Module Indicators

Table 8-1. Description of Ethernet Base Module Indicators

Protocol	Indicator	State	Status
All	CP	Flashing green	Application is operational
All	CC	Green	Reserved
All	F3	Green	Reserved
All	F4	Green	Reserved
Switching and Standard Frame Relay Only	P1, P2, P3 (representing Ports 1, 2, and 3)	Off Amber Green Red	Interface not active Physical connection exists however PVC LMI is not operational PVC LMI is operational Physical connection is lost, PVC LMI is not operational
HTDS and CBR Only	P1, P2, P3 (representing Ports 1, 2, and 3)	Off Amber Green Red	Interface not active No physical connection Application operational Not used

T1/E1 Voice Module

There are 13 indicators associated with the T1/E1 Voice Module; six for the Digital Voice channels and seven for the Voice Module.

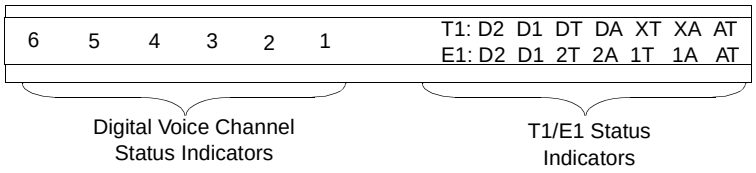


Figure 8-3. T1/E1 Access Module Indicators

Digital Voice Channel Status Indicators

Indicators 1 through 6 represent, respectively, the status of the digital voice channels B1 through B6, as follows:

Table 8-2. Digital Voice Channel Status Indicators

State	Status
Off	Digital Voice Module not installed or defective, or power is off
Green	Digital voice channel is connected, and active voice call is in progress
Flashing green	Test in progress
Quick-flashing green	Download in progress
Amber	Idle (both ends on-hook)
Flashing amber	Fax call in progress
Red	Waiting for code download
Flashing red	Busy
Quick-flashing red	Alarm/Test Failure

T1 and E1 Status Indicators

Table 8-3. T1 Operational States

Indicator	Function	State	Status
AT	System Status	Off	Initialization mode – see Table 8-5.
		Green	Operational mode
		Flashing green	Download active.
XA, DA	DSX-1 interface (XA) and DS-1 interface (DA) alarm status	Off	Interface not active.
		Flashing red	Red alarm – sync loss (an out of frame condition) that lasts for more than 2.5 seconds.
		Flashing amber	Yellow alarm – received from the remote node that is currently in the red alarm state.
		Flashing green	Alarm Indication Signal (AIS) – Transmitted to the remote end when the T1 Voice Module is in the internal digital loopback state. When received from the remote end, the T1 Voice Module enters the AIS alarm state.
		Green	Interface operational.
XT, DT	DSX-1 interface (XT) and DS-1 interface (DT) test status	Red	Test in progress – XA or DA shows test status.
		Off	No test.
D1, D2	Data ports 1 (D1) and 2 (D2)	Off	Not active
		Green	Connected
		Flashing green	Loopback mode

Table 8-4. E1 Operational States

Indicator	Function	State	Status
AT	System Status	Off	Initialization mode – see Table 8-5
		Green	Operational mode
		Flashing green	Download active
1A, 2A	E1 Line 1 (1A) and Line 2 (2A) interface alarm status	Off	Interface not active
		Flashing red	IFAS (Frame Alignment Signal) loss
		Flashing amber	FAS distant alarm
		Fast flashing green	TS16 AIS (Time Slot 16 Alarm Indication Signal)
		Green	Interface operational
		Fast flashing red	CRC4 loss or MFAS loss
		Flashing green	AIS (Alarm Indication Signal)
		Fast flashing amber	MFAS distant alarm
1T, 2T	E1 Line 1 (1T) and line 2 (2T) interface test status	Red	Line loopback test in progress – 1A or 2A shows test status
		Flashing red	Channel loopback or pattern test in progress
		Off	No test
D1, D2	Data ports 1 (D1) and 2 (D2)	Off	Not active
		Green	Connected
		Flashing green	Loopback mode

Table 8-5. T1 and E1 Status Indicator Initialization States

T1/E1 indicator	D2	D1	DT/2T	DA/2A	XT/1T	XA/1A	AT
Power Off	Off	Off	Off	Off	Off	Off	Off
Reset	Green	Green	Red	Off	Red	Off	Green
RAM Test	Off	Off	Off	Red	Off	Off	Off
Boot Checksum Test	Off	Off	Off	Off	Red	Off	Off
Download Required	Off	Off	Red	Off	Off	Off	Off
Downloading Code	Off	Off	Off	Off	Off	Off	FlashGrn
TAM Initialization	Off	Off	Off	Off	Off	Red	Off

Digital Voice Expansion Module

There are 13 indicators associated with the Digital Voice Expansion Module, as shown below.

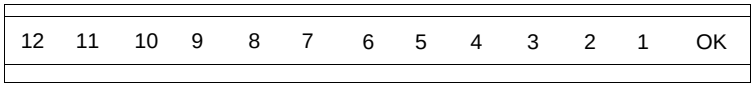


Figure 8-4. Digital Voice Expansion Module Indicators

Table 8-6. Description of Digital Voice Expansion Module Indicators

Indicator	State	Status
OK	Off	Digital Voice Expansion Module is not installed, off, or defective
	Red	Reset
	Green	Operational
1-12*	Off	Digital Voice Module is not installed or defective
	Green	Digital Voice Module is installed, and active voice call is in progress
	Flashing green	Test in progress
	Quick-flashing green	Download in progress
	Amber	Idle (both ends on-hook)
	Flashing amber	Fax call in progress
	Red	Waiting for code download
	Flashing red	Busy
	Quick flashing red	Alarm/Test Failure
*Indicators 1-12 represent voice channels C1-C12 when the Digital Voice Module is located in LIM C, channels D1-D12 when the Digital Voice Module is located in LIM D. (Refer to page 10-2 for information on LIMs.)		

Analog Voice Module and Universal Analog Voice Module

There are a total of six indicators associated with each voice/fax channel of both the Analog Voice Module and the Universal Analog Voice Module. The following figure shows and describes the functions of the indicators during normal operation.

Note: During network code download, each red indicator is turned on and off sequentially for 1 second.

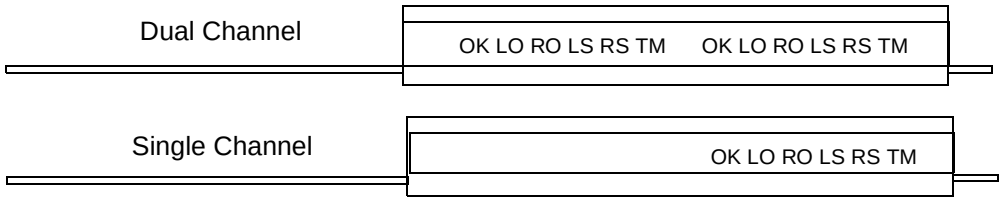


Figure 8-5. Analog Voice Module Indicators

Table 8-7. Description of Analog Voice Module Indicators

Indicator	State	Status
OK	On	Channel is in normal operating mode.
	Flashing	Channel is in fax mode.
	Off	Channel is inoperative.l
LO	On	E&M or FXS – channel is off-hook. FXO outgoing call – second dial tone is heard. FXO incoming call – call is answered.
	Flashing	Channel is in busyout state.
RO	On	Remote channel is attempting to contact local channel.
LS	On	Voice/fax traffic is flowing to remote end.
RS	On	Voice/fax traffic is obtained from remote end.
TM	Always off	

ISDN BRI Voice Module

The ISDN BRI Voice Module has three indicators (LEDs) located at the front of the unit. These indicators are shown and described in the table below.

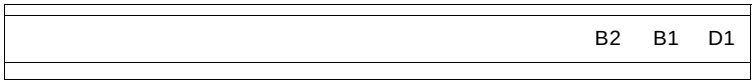


Figure 8-6. BRI Voice Module Indicators

Table 8-8. BRI Voice Module Indicator Functions

Indicator	Function	Blinks	On	Off
B2	Green indicator associated with B-channel 2.	When connection is being established on B-channel 2	When B-channel 2 connection is established	When B-channel2 is not connected
B1	Green indicator associated with B-channel 1.	When connection is being established on B-channel 1	When B-channel 1 connection is established	When B-channel 1 is not connected.
D1	Green indicator associated with the D-channel	When port is in an off-line or diagnostics state	When port is on-line and operational	

Power Supplies 9

This chapter discusses the power supplies available for the following Passport units:

- 3-slot Chassis power supply (Passport 4430 AC, page 9-1)
- 5-slot Chassis power supply (Passport 4450 AC/DC and Passport 4455 AC/ACR, page 9-2)
- 5-slot Redundant power supply (Passport 4450 ACR/DCR, page 9-3)

3-slot Chassis

The 3-slot Passport 4430 chassis uses a 135 W AC power supply to provide power to the Ethernet Base Module and expansion modules.

Note: The three-slot Passport 4430 unit uses AC power only. There is no option for DC power.

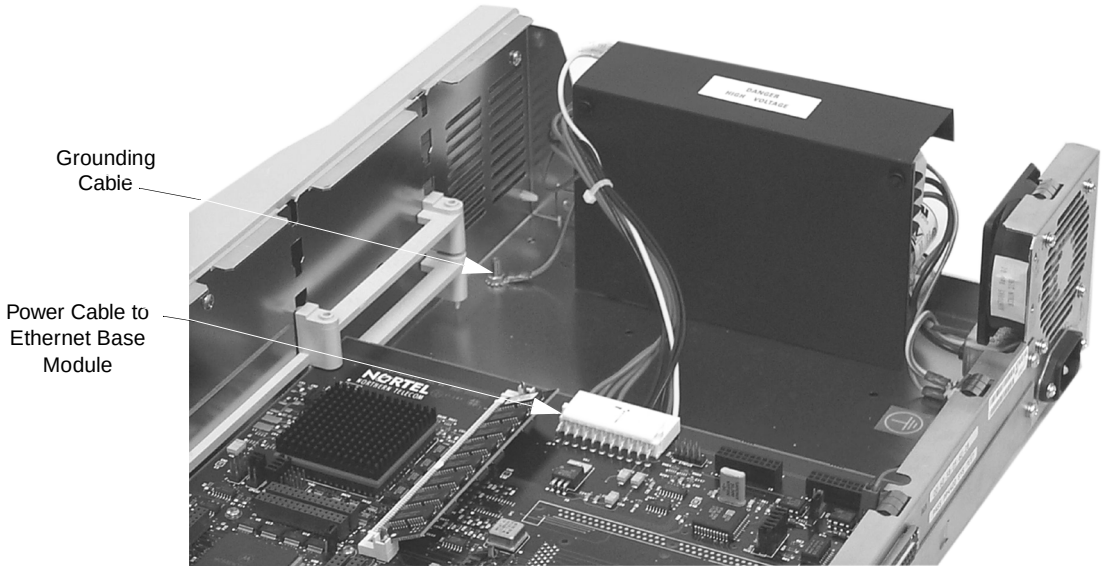


Figure 9-1. 3-slot Power Supply

The power cable connects to the Ethernet Base Module. All expansion modules in the unit draw power from the Ethernet Base Module through stacking connectors on the modules.

5-slot Chassis

The five-slot Passport 4450 chassis uses a 160W power supply to provide power to the Ethernet Base Module and expansion modules. Both AC and DC models are available; the figure below shows an AC unit.

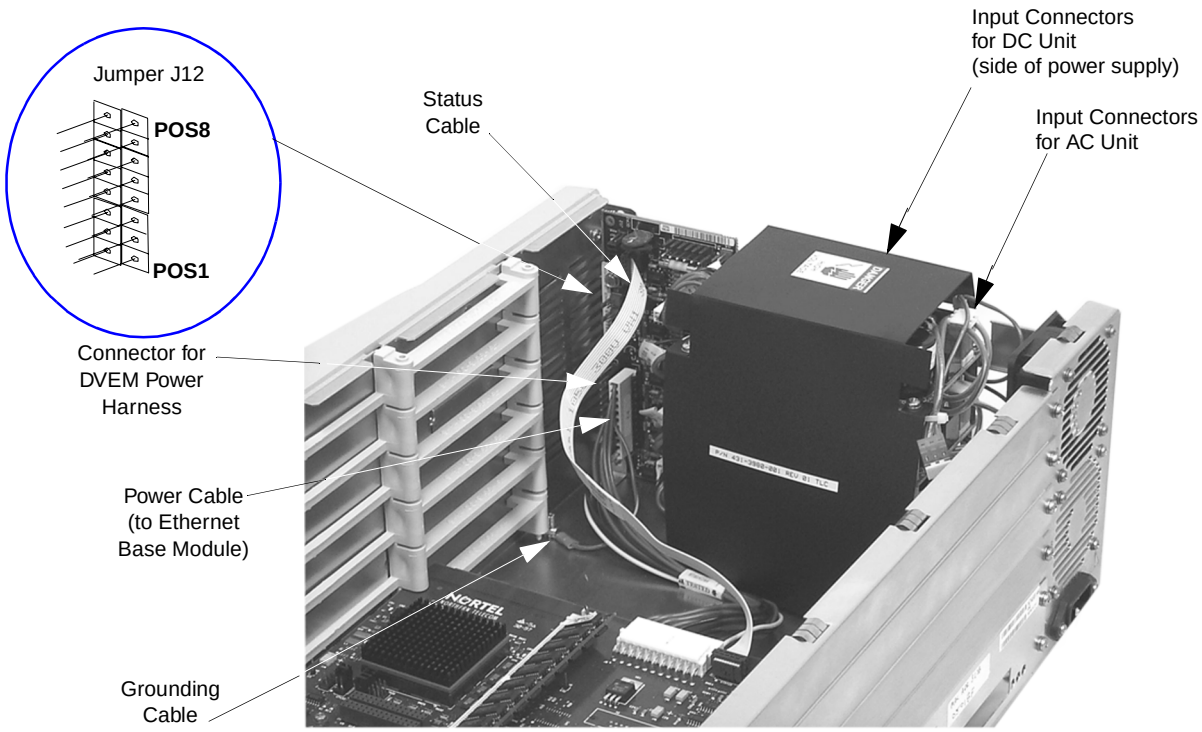


Figure 9-2. 5-slot Passport 4450 Power Supply

Digital Voice Expansion Module Power Harness

The Digital Voice Expansion Module power harness provides redundant power for Passport 4450 units containing one or more Digital Voice Expansion Modules. The power harness connects the modules to the power sharing board (see Figure 9-2 above, and Figure 5-12 on page 5-12, for more information concerning the Digital Voice Expansion Module Power Harness).

5-slot Chassis with Redundant Power Supply

A 5-slot Passport 4450 chassis with the redundant power supply option contains a subassembly that houses an extra power supply in the event that one of the original four fails. This unit is available in either AC and DC power; the figure below shows an AC unit.

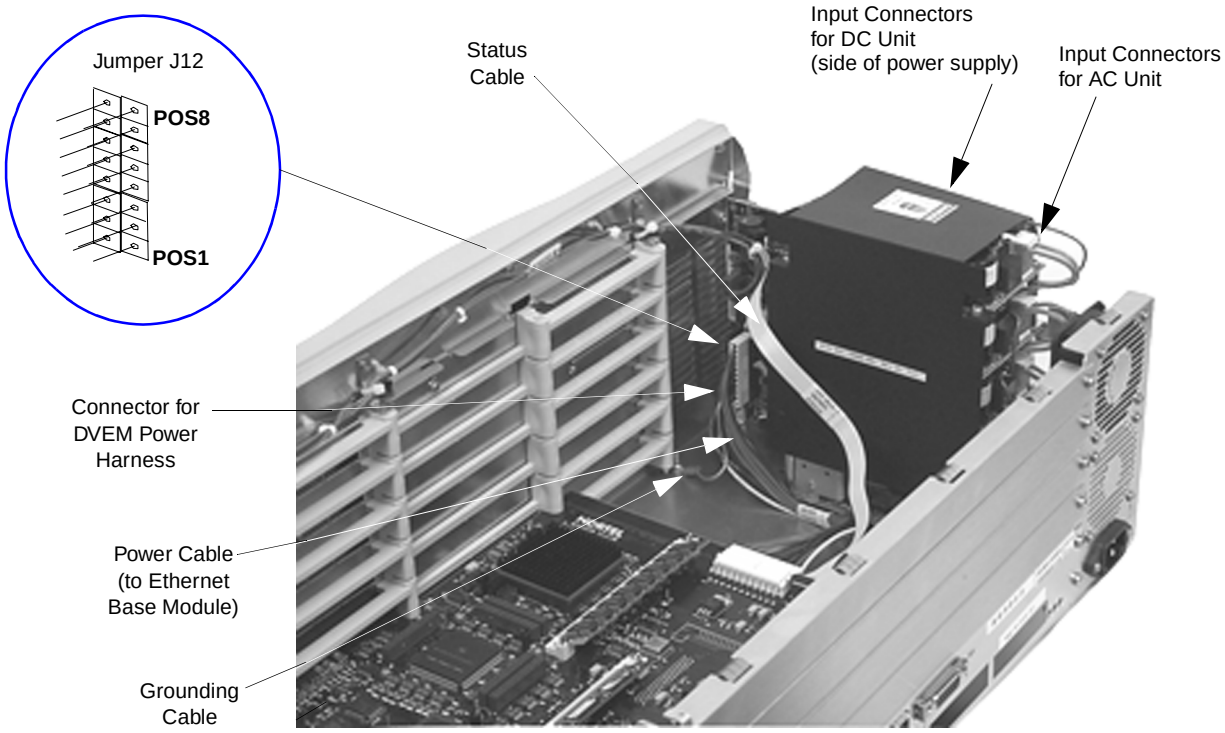


Figure 9-3. 5-slot Passport 4455 with Redundant Power Supply

Two indicator lights that monitor the power supplies are located at the top right side of the front bezel. The triangle-shaped (green) indicator is lit when all power supplies are working properly. The rectangle-shaped (red) indicator lights up when there is a problem with one or more power supplies in the unit, or when too many power supplies are connected (see Table 9-1 on page 9-5).

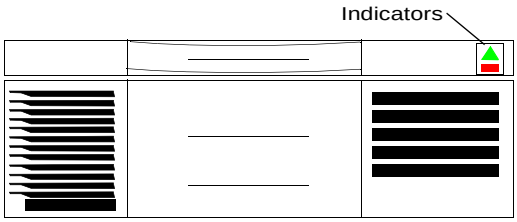


Figure 9-4. Indicators for Passport 4400 Unit with Redundant Power Supply

DC Power Supplies

The DC power supply system allows the Passport 4400 unit to be installed in a telephone company environment with the necessary DC power input being furnished by the telephone company to the input of the Passport 4400 unit.

Note: The Input Connectors on the DC power supply are located at the side of the power supply closest to the edge (see Figure 9-2 and Figure 9-3).

The -48 volts DC version of the Passport 4400 unit power supply system is identical to the AC version except for the addition of a terminal power adapter that plugs into the line cord Electronic Industry Association (EIA) jack on back of the unit. The five power supplies stack identically to the AC version. The connectors accept the same cables for input and output power.

The DC input voltage must be within the range of -32 volts DC and 72 volts DC. The plus (+) and minus (-) markings on the input power adapter box indicate the polarity of corresponding battery connections. They are electrically floating and can either be connected to house ground or the appropriate DC return. An additional case ground screw is also on the power adapter box. This connection must be grounded to the chassis safety ground for safety and electrical noise suppression. Do not operate the unit without the ground screw connected to the safety ground.

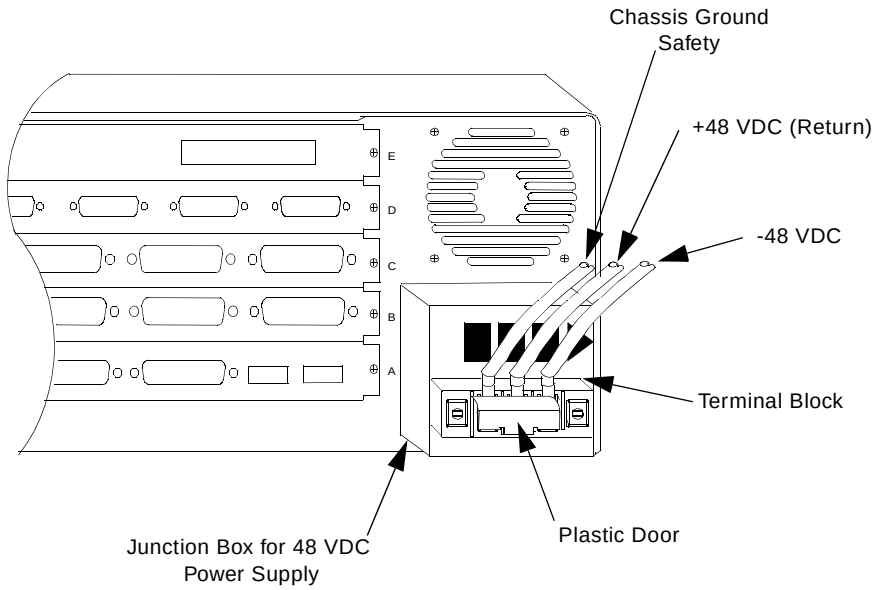


Figure 9-5. DC Power Supply

Configuring the Power Supplies

Note: The following information applies to five-slot Passport 4450 unit only. Three-slot Passport 4430 units do not need to be configured.

The power supply at the bottom of the stack is called the master supply. All other supplies located above the master are called slave supplies. The five-slot models have one master and either three (4450 AC/DC) or four (4450 AC/ACR) slave power supplies.

> ⚠ ***Caution:*** Disconnect all power from the unit before performing these procedures.

The AC input connectors (orange in color) are located at the rear of the unit, behind the fan (see Figure 9-2 on page 9-2).

The DC input connectors (orange in color) are located at the outer side of the power supply (see Figure 9-2 on page 9-2).

If adding new modules to a unit, ensure that the power supplies are properly configured by following these procedures.

Table 9-1. Configuring the Power Supplies

For Units Containing...	Standard Power Supply	Redundant Power Supply	AC Units...	DC Units...
1-3 Modules including the base module	Be sure that the AC/DC input connector of the top power supply is unplugged	Be sure that the AC/DC input connectors of the top two power supplies are unplugged	Strap jumper J12 according to Table 9-2	Strap jumper J12 according to Table 9-3
4-5 Modules including the base module	Plug in all four AC/DC input connectors of the power supplies	Plug in all five AC/DC input connectors of the power supplies		

> ⚠ ***Caution:*** Prior to turning on your unit, be sure to check the straps for proper positioning according to the particular unit you have. Incorrect strapping will cause the unit to malfunction.

Notes:
- Jumper position one is strapped only when you have a redundant power supply installed. Notice for a 5-slot standard model that position number one is not strapped, regardless if it has 1 to 3, or 4 to 5 modules installed
- Jumper position six is strapped for all 5-slot models regardless of the number of modules installed
- Jumper position eight is for detecting failed power supplies. Make sure that position eight is NOT strapped for a 5-slot model with 4 to 5 modules installed. If position eight is strapped, then the unit can not detect if the fourth or fifth power supply fails. This strap is installed at the factory and needs to be removed when you add the fourth module

Table 9-2. Jumper 12 Strapping for the AC Units

Passport 4400 Unit Model and Configuration	**Jumper Positions (J-12)**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
5-slot standard, AC, 1 to 3 modules		X	X	X	X	X	X	X
5-slot standard, AC, 4 to 5 modules		X	X	X	X	X	X	
5-slot redundant, AC, 1 to 3 modules	X	X	X	X	X	X	X	X
5-slot redundant, AC, 4 to 5 modules	X	X	X	X	X	X		

Table 9-3. Jumper 12 Strapping for the DC Units

Passport 4400 Unit Model and Configuration	**Jumper Positions (J-12)**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
5-slot standard, DC, 1 to 3 modules		X	X	X		X	X	X
5-slot standard, DC, 4 to 5 modules		X	X	X		X	X	
5-slot redundant, DC, 1 to 3 modules	X	X	X	X		X	X	X
5-slot redundant, DC, 4 to 5 modules	X	X	X	X		X		

General Installation 10

This section contains general installation information for all optional expansion modules for Passport 4400 units. For more information on setting up individual modules for installation, refer to the following sections:

- Chapter 4, Data Modules
- Chapter 5, T1, E1, and Digital Voice Modules
- Chapter 6, Analog Voice Modules
- Chapter 7, Interface Modules (WAN)

Safety Information

Before performing any of the procedures included in this section, refer to the safety information in Appendix -B.

> ***Caution:*** Modules cannot be inserted into or removed from the unit while the Passport 4400 unit is operating. This could cause damage to the unit or interruption of network service or both.

> ***Caution:*** Do not connect external cables until module installation is complete.

> ***Warning:*** When working inside the unit, be sure to take all precautions against electrostatic discharge.

Module Stacking Order

Before placing any expansion modules into the Passport 4400, the stacking order must be determined. Table 10-1 shows the proper stacking order for each expansion module.

Notes:
- Voice modules (AVM, UAVM, DVEM, TVM, EVM) are always logically referred to as LIMs B, C, D, E.
- Data modules (HDM, LEM, LDM) are always logically referred to as LIMs 1, 2, 3, 4

Using the table, determine them stacking order for your Passport 4400 expansion modules. For instance, a Passport 4400 unit with a T1 Voice Module

(TVM), an Analog Voice Module (AVM), and a High-Speed Data Module (HDM) would have the HDM in the first slot (physical slot B) above the EBM, followed by the TVM and the AVM (physical slots C and D). Modules must be stacked from bottom to top, without skipping a slot.

Notes:
- TVM/EVM must always be called LIM B regardless of its location in the stacking order
- If you are using one HDM, it must always be in LIM 1 (physical slot B). If you are using two HDMs, they must be in LIM 1 and 2 (physical slots B and C)
- The ISDN BRI module is stacked above the data modules and the TVM/EVM.

Table 10-1. Module Stacking Order

Top

Module	Maximum Number in Unit	LIM (Logical Location)	Slot (Physical Location)	Stacking Rules to Follow
Analog Voice Module (AVM)	4	B, C, D, E	B, C, D, E	Anywhere
Universal Analog Voice Module (UAVM)	4	B, C, D, E	B, C, D, E	Anywhere
Digital Voice Expansion Module (DVEM)	2	C, D, E	C, D, E	Directly above TVM/ EVM
T1 Voice Module or E1 Voice Module (TVM/EVM)	1	LIM B only	B, C, D, E	Anywhere
ISDN BRI Voice Module (IVM-BRI)	4	B, C, D, E	B, C, D, E	Must be directly above data modules, base module, or another ISDN BRI module
Legacy Data Expansion Module (LEM)	2	2, 3, 4	C, D, E	Directly above LDM
Legacy Data Module (LDM)	1	1, 2, 3, 4	B, C, D, E	Directly above EBM or HDM
High-Speed Data Module (HDM)	2	1, 2	B, C	Directly above EBM or other HDM
Ethernet Base Module (EBM)	1	N/A	A	Always at bottom

Bottom

Determining the Logical Interface Module (LIM) Identifier

Once the stacking order is determined, each expansion module must be assigned to a Logical Interface Module (LIM). The Passport 4400 uses the LIM identifier to track of the position of each module within the unit. This is set using a four-position switch group located on the module.

Modules with numeric switches (data modules) are assigned LIMs starting at 1 and continuing up to 4. Modules with alpha switches (voice modules) are assigned LIMs starting at B and continuing up to E (LIM A is already assigned to the Ethernet Base Module). The table below shows a typical configuration

in its physical location and its logical location Note that even though the High-Speed Data Module physically resides just above the Ethernet Base Module (in slot B), logically, its in LIM 1 (because the T1 Voice Module and Digital Voice Expansion Module must be in LIMs B, C and D).

Physical Slot		Logical LIM
E	DVEM	D
D	DVEM	C
C	TVM/EVM	B
B	HDM	1
	Ethernet Base Module	

All modules contain a module location switch group, as shown in Figure 10-1 This switch group informs the software of the module's logical location within the Passport 4400 unit. It must be set as shown in the chart on the next page.

In most cases, the module location switch group should match the physical location of the module. In some instances, the logical location (set by the switch group) will differ from the physical location. This is true in the case of voice modules in the same unit, such as a T1 or E1 module. The T1 or E1 module must be set for logical location B, but can reside in any physical location. Conversely, the High-Speed Data Module must physically reside in Slot B directly above the Ethernet Base Module, but can logically be placed in LIM 1 or 2.

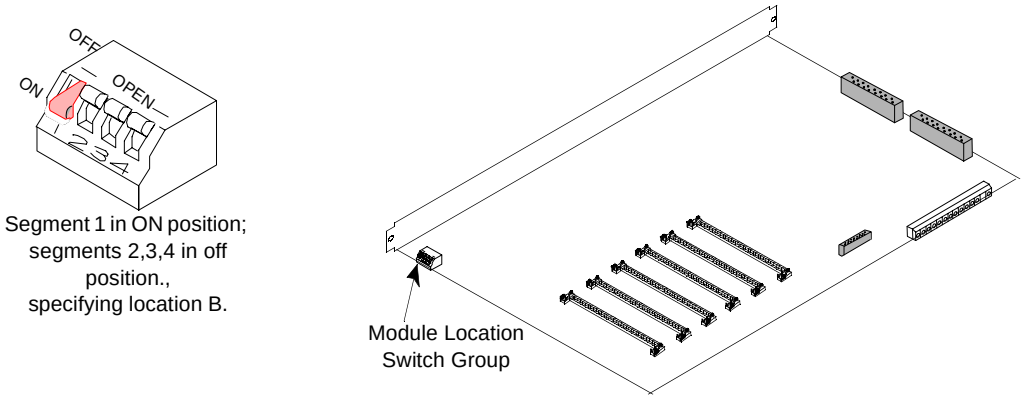

OFF
ON
OPEN
1 2 3 4
Segment 1 in ON position; segments 2,3,4 in off position., specifying location B.
Module Location Switch Group

Figure 10-1. Module Location Switch Group

	Switch Segment			
Location	1	2	3	4
B	ON	OFF	OFF	OFF
C	OFF	ON	OFF	OFF
D	OFF	OFF	ON	OFF

To set a switch segment to ON, use a ballpoint pen or similar pointed tool and push the switch down (towards the edge of the module).

Setting the Switch Group

To set a switch to on, use a ballpoint pen or similar pointed tool and push the switch down. Take care that only one switch is *on* (down) and that the remaining three switches are *off* (up) (see Figure 10-2 below).

Notice that each switch can represent either a numeric LIM or an alpha LIM, depending on the expansion module. For instance, setting the left-most switch to *on* would assign LIM 1 to a data module; the same switch settings on a voice module would assign LIM B.

LIM assignments are used by the software when configuring the modules.

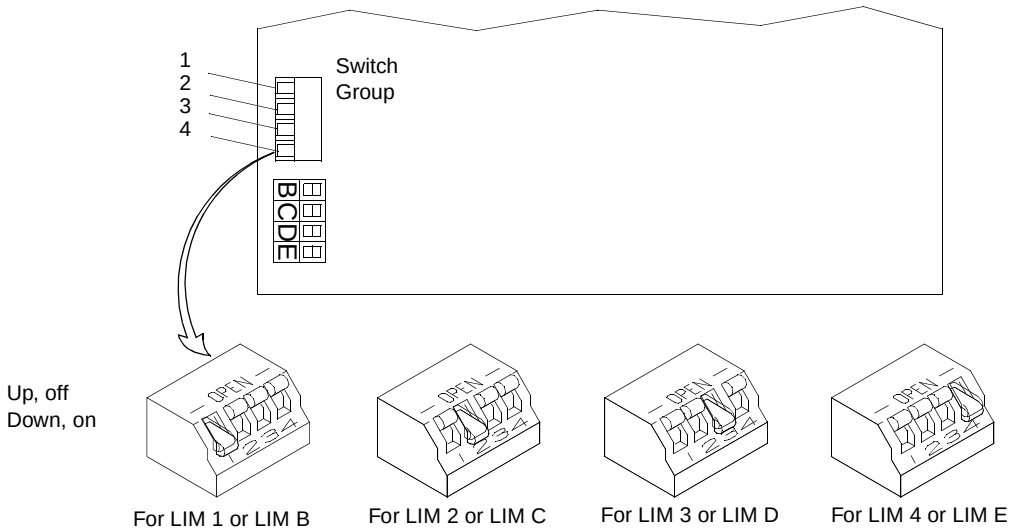
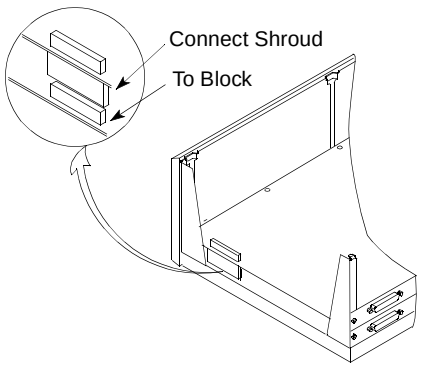


Figure 10-2. Dip Switch Locations

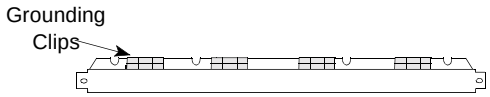
Stacking Connectors

Stacking connectors act as a bus allowing data to be transferred between the expansion modules and the base card; they must be firmly seated within their mating connectors.



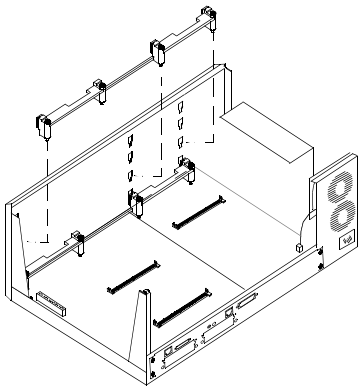
Back Panel Grounding Clips

To ensure that the modules meet regulatory agency requirements, the grounding clips **must not** be removed from the back panel.



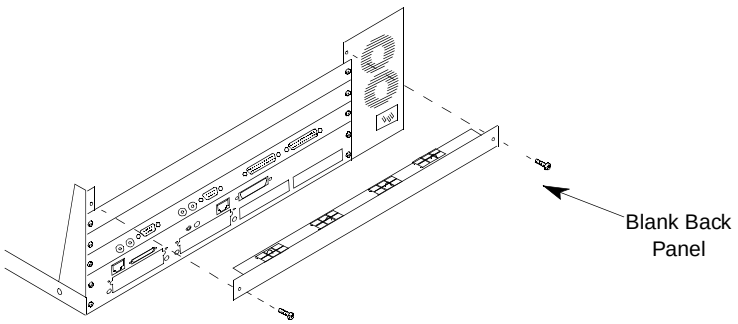
Spacers

Spacers are attached to the inside of the front of the Passport 4400. They are used to secure the expansion modules inside the unit.



Blank Back Panels

Any open space not occupied by a module must contain a blank back panel. Blank back panels ensure proper air flow over installed module, keep excessive dirt and contamination out of*** the unit, and ensure compliance with radiated emissions standards. Remove the blank back panels to accommodate new modules, and reinstall a blank back panel if a module is removed.



Installing an Expansion Module

Modules should be set for the appropriate application when they arrive from the factory. If changes need to be made to the module, such as setting jumpers or switches, refer to the appropriate section that specifically covers the module. To install an expansion module, us the following procedures.

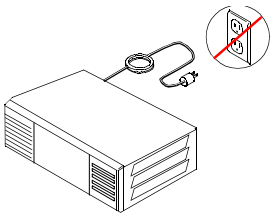
> ***Caution:*** Modules cannot be inserted into or removed from the unit while the Passport 4400 unit is operating. This could cause damage to the unit or interruption of network service or both.

> ***Warning:*** When working inside the unit, be sure to take all precautions against electrostatic discharge.

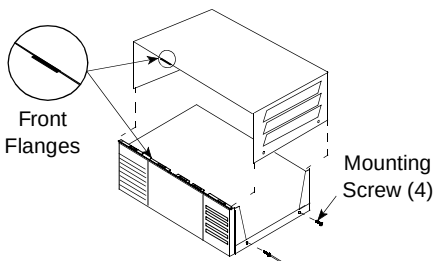
Note: Make sure that you have adequate clearance, at least 6 inches (15 cm) above the cover and on the sides of the unit, to accommodate the use of a screwdriver.

To complete these procedures you will need a Phillips screwdriver, size 1 or 2.

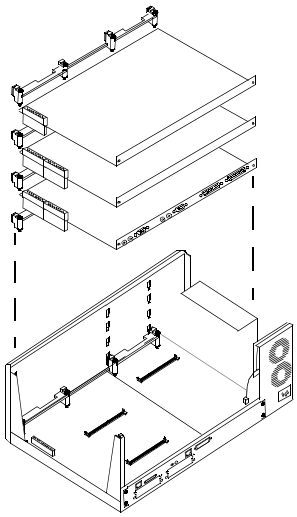
1. Remove the power from the unit by unplugging the cord from the wall socket.



2. Unscrew the four screws (two on each side of the cover). Save the screws.
3. Push the cover toward the back of the unit until the front flanges are uncoupled.
4. Lift off the cover.
5. Remove blank back panels as required.



6. Refer to Section 9, Power Supplies, to verify that the correct number of power supplies are configured for the number of modules used in the unit.
7. Strap the module, (refer to the section for the individual module).
   — Section 4, Data Modules
   — Section 5, T1, E1, and Digital Voice Modules
   — Section 6, Analog Voice Modules.
8. Set the module location switch group (see page 10-4).
9. Place a spacer between the previous module and the module to be installed.
10. Place the module on the spacer in front and on the previous module's back panel in the back. The back panel goes on the outside of the chassis.
11. Connect the stacking connector. Press down so that they mate completely.
12. Align the two holes on the module back with the two holes on the back of the chassis. Using screws, join the back panel to the chassis.
13. Continue to stack modules using steps 7-12 until all modules have been installed.
14. Ensure that any blank module locations contain blank back panels.
15. Close the unit by replacing the cover.



Connecting a Workstation 11

This chapter describes the requirements and procedures for establishing a direct or modem connection between a Passport 4400 unit and the workstation that you will use to manage that unit.

Connecting the PC to the Passport 4400 Management Port

You can connect the PC's serial port to the Passport 4400's Management Port, either directly or through a modem.

Direct Connection

If the PC and Passport 4400 are in physical proximity to one another, you can directly connect them using the cable supplied with the Passport 4400 (cable number NTAU17AA), as shown in this diagram:

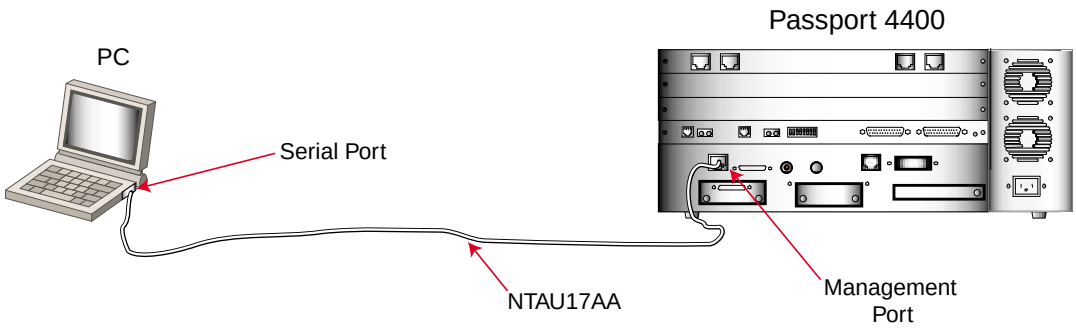


Figure 11-1. Connecting a Passport 4400 Unit to a PC

Connect the DB-25 end of the cable to the PC and the RJ-45 end of the cable to the Passport 4400 management port.

Note: You may need a 9-pin-to-25-pin RS-232/V.24 serial port adapter (or a female-to-female 25-pin adapter) to connect the cable to the PC.

Modem Connection

If the PC and the Passport 4400 unit are not in physical proximity to one another, you can connect them through a modem, as shown in this diagram:

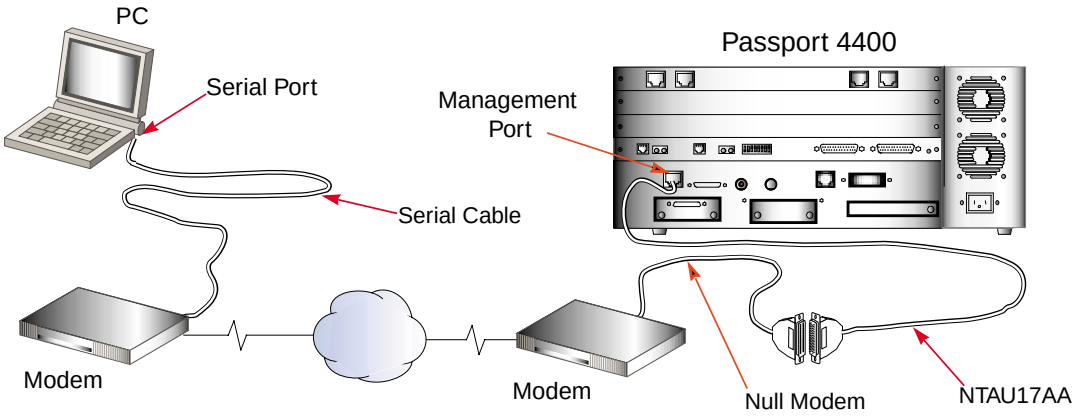


Figure 11-2. Connecting a Passport 4400 Unit to a Modem

Modem Cable Connections

When using a modem connection, you need to make the following cable connection between the Passport 4400 unit and the modem to which it is connected:

- Connect the RJ-45 end of the Passport cable (cable number NTAU17AA) to the Passport 4400 management port
- Connect the DB-25 end of the Passport 4400 management cable (cable number NTAU17AA) to a null-modem. (You may need a 9 pin-to-25 pin RS-232 serial port adapter, or a female-to-female 25-pin adapter, to make this connection.)
- Connect the null-modem to the modem

Configuring the Modem Attached to the PC

When configuring the modem that is attached to your workstation, be sure to choose the correct driver for the device. Once the modem is installed, configure the modem properties with the phone number of the modem that is attached to the Passport 4400 unit.

Configuring the Modem Attached to the Passport 4400

The modem that is attached to the Passport 4400 unit must be configured for *Quiet* operations (no result code, no command echo/local echo).

You can use a terminal emulation program or a dumb terminal to configure the modem. In either case, you must set the serial port baud rate to match that of the Passport 4400 management port (the default is 9600 baud).

Use your modem documentation and the procedure that follows as a guide to configuring the modem.

Procedure Using a Hayes-Compatible Modem

To configure a Hayes-compatible modem for Quiet operations, follow these steps:

1. Connect the PC (or terminal) to the modem. Refer to your modem documentation to determine the cabling requirements.
2. Start the terminal emulation program.
3. Set the serial port baud rate to match that of the Passport 4400 management port (the default is 9600 baud). If the serial connection to the modem is not made at 9600 bps, then communications will be lost when connecting the modem to the Passport 4400 management port.
4. Issue the following sequence of AT commands to the modem to adjust the default settings that may be incorrect (refer to modem documentation):

AT Command	Description
AT&F	Set the modem to factory defaults. Refer to your modem documentation to determine the required format for this command.
ATS0=1	Sets the modem to answer on the first ring.
AT&D	Ignore DTR (always on)
ATQ1	Do not return result codes.
ATE0	Echo disabled.
AT&W	Write and save the current settings to NVRAM (nonvolatile RAM). This retains the configuration through power cycles.

5. Once the modem is configured, connect the DB-25 end of the cable (NTAU17AA) to the null modem cable. Then, connect the null modem cable to the Hayes-compatible modem (see Figure 11-2 on page 11-2).

> ***Warning:*** Inaccurate modem settings and incorrect cabling may cause interruption of service on the Passport 4400 unit when attempting to dial in.

The Passport 4400 unit should now be ready to receive calls.

Note: If your modem doesn't support the Hayes AT commands, consult your modem documentation for the procedure for your particular modem.

Procedure Using a US Robotics Sportster Series Modem

The following is an example of modem configuration using a US Robotics Sportster Series Modem (other modems will be different, consult your modem manual).

Configurating the modem requires hardware configuration (dip switches) and software configuration (AT commands). The chart below lists the hardware settings.

Table 11-1. Switch Settings

Switch Number	Setting Description	Required Setting
1	Modem ignores DTR (override)	ON (down)
2	Verbal (word) results	OFF (up)
3	Disables result codes	OFF (up)
4	Suppresses echo	ON (down)
5	Modem answers on first ring, or higher if specified in NVRAM	OFF (up)
6	Modem sends CD signal when it connects with another modem, drops CD on disconnect	OFF (up)
7	Loads Y or Y1 configuration from user defined nonvolatile memory (NVRAM)	OFF (up)
8	Disables command recognition (dumb mode)	OFF (up)

Use the settings described in the switch setting table, but set the modem to Smart Mode (hardware switch 8 ON (down).

To configure a US Robotics Sportster Series modem, follow these steps:

1. Connect the PC (or terminal) to the modem. Refer to your modem documentation to determine the cabling requirements.
2. Start the terminal emulation program.
3. Issue the following sequence of AT commands to the modem to adjust the default settings that may be incorrect (refer to modem documentation).

AT Command	Description
AT&F	Set the modem to factory defaults. Refer to your modem documentation to determine the required format for this command.
ATS0=1	Sets the modem to answer on the first ring.
AT&D	Ignore DTR (always on)
ATQ1	Do not return result codes.
ATE0	Echo disabled.
AT&W	Write and save the current configuration settings.

4. Power the modem off and return the modem to dumb mode by setting hardware switch 8 to OFF (up). Connect the DB-25 end of the Passport 4460 management cable (NTAU17AA) to a null modem cable. Then connect the null modem cable to the US Robotics modem (see Figure 11-2 on page 11-2).

> ***Warning:*** Inaccurate modem settings and incorrect cabling may cause interruption of service on the Passport 4400 when attempting to dial in.

The Passport 4400 unit should now be ready to receive calls.

> **Note:** If your modem doesn't support AT commands, consult your modem documentation for the procedure for your particular modem.

Testing the Modem Configuration

You can test the modem configuration by using a terminal emulation program (such as HyperTerminal or ProComm), to call the modem connected to the Passport 4400 unit. You will see the CLI prompt when you successfully connect.

In Case of Difficulty

Your modem baud rate must match that of the Passport 4400 management port. If your modem is set to something other than 9600 baud, and you subsequently reset the Passport 4400 unit to its factory defaults, your modem connection will fail. In this case, you need to reset the modem to 9600 baud by unlocking the speed (AT&B0), changing the speed of the PC (or terminal connection) to 9600 baud, then locking the modem to this new speed. For this reason, although it slows communications with the Passport 4400 unit, it is recommended that you not change the management port speed from the default value (9600 baud).

Ethernet Connection

If the Passport 4400 unit has already been configured with an IP address, you can connect your workstation to the unit using the Ethernet port on the Ethernet Base Module.

Figure 11-3 displays a typical Ethernet connection.

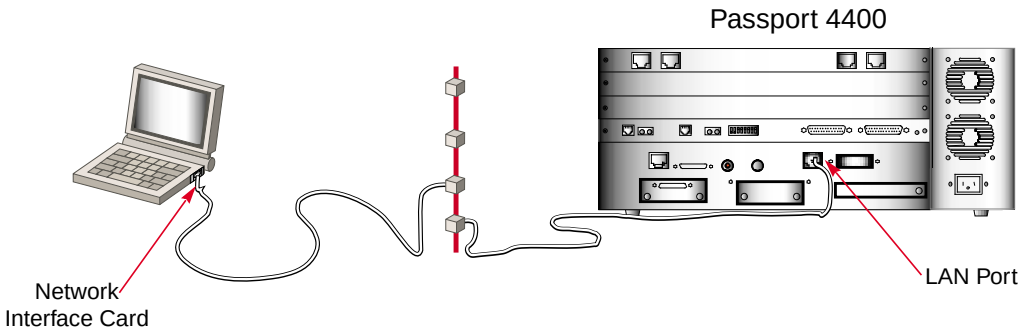


Figure 11-3. Connecting a Passport 4400 Unit to the Ethernet

Reset Switch

A reset switch is located on the base module and can be accessed from the back of the unit, as shown below. Use a small, pointed object to press the reset switch through the hole in the back panel. The green reset indicator is also located on the base module next to the reset switch.

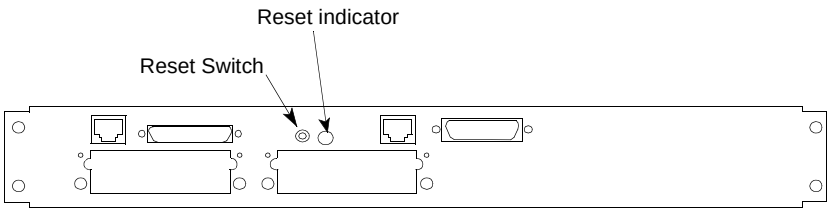


Figure 11-4. Location of Reset Switch

Three types of resets are available depending on whether you are installing a new Passport 4400 unit, replacing an existing Passport 4400 unit, or resetting an existing Passport 4400 unit. Refer to Table 11-2 for the reset appropriate for your installation.

Table 11-2. Using the Reset Switch

Press switch for...	Type of reset	Indicator
1-5 seconds	Resets the CPU. Without diagnostics.	On
6-10 seconds	Resets by reading existing configuration from flash. With diagnostics.	Slow flashing
10+ seconds	Resets by restoring all configuration parameters to their factory default values. WIth diagnostics.	Fast flashing

Cable Diagrams A

Diagrams are shown in this section for cables used with the Passport 4400 (4430/4450/4455). Use the cable matrix to determine which cable must be used for the desired interface.

Table A-1. Cable Selection for Ethernet Base Module and Data Modules

Port	Connector	Type of Interface	CPC No.	Engineering code	Connects to....	Page No.
Management Port	RJ-45	RS232/V.24	A0668482	NTAU17AA	DTE, M-M	A-3
	RJ-45	RS232/V.24		NT0227AA	DTE DB-9, DB-25 male)	A-4
Frame Relay Ports	50-pin connector	RS232/V.24	A0668483	NTAU18AA	DCE (DB-25 male) (15 ft.)	A-9
		V.35[1]	A0668485	NTAU20AA	DCE (34-pin male) (15 ft.)	A-6
		X.21	A0668492	NTAU26AA	DCE (DB-15 male) (15 ft.)	A-7
		V.36 Type 1	A0668487	NTAU22AA	DCE (37-pin male) (15 ft.)	A-13
		V.36 Type 2	A0668490	NTAU24AA	DCE (37-pin male) (15 ft.)	A-15
		RS232/V.24	A0668484	NTAU19AA	DTE (DB-25 female) (15 ft.)	A-10
		RS232/V.24		NT0263AA	DTE (DB-25 female) (15 ft.)	A-11
		V.35[1]	A0668486	NTAU21AA	DTE (34-pin female) (15 ft.)	A-5
		X.21	A0668493	NTAU27AA	DTE (DB-25 female) (15 ft.)	A-8
		V.36 Type 1	A0668488	NTAU23AA	DTE (37-pin female) (15 ft.)	A-12
		V.36 Type 2	A0668491	NTAU25AA	DTE (37-pin female) (15 ft.)	A-14
		V.35[1]	A0669199	NTAU30AA	DCE (DB-15 male) (15 ft.)	A-16

[1] Cables that do not conform to ITU V.35 specification may introduce errors in the network that the Passport unit may not be able to correct or adjust.

DTE = Data Terminal Equipment

DCE = Data Communications Equipment

Note: The V.35 cables listed in this table are 4.6 meters (15 feet) in length. If higher speed services (greater than 192 kb/s), are being run, the cable length should not exceed 3 meters (10 feet) to conform with ITU V.35 specifications.

Table A-2. Cable Selection for T1, E1, and Digital Voice Modules

Port	Connector	Type of Interface	CPC No.	Engineering code	Connects to....	Page No.
56k CSU/DSU,	RJ-45	straight	A0670357	NTML79AA	4400 CSU/DSU Cable (RJ-45 to RJ-45) (14 ft.)	A-18
T1 CSU/DSU E1 CSU/DSU	RJ-48C	crossover	A0670698	NTMV09AA	4400 CSU/DSU Crossover Cable (RJ-45 to RJ-45) (14 ft.)	A-19
DS-1 for use with T1	RJ-48C	straight	A0670357	NTML79AA	modular straight cable	A-18
		crossover	A0670698	NTMV09AA	modular crossover cable	A-19
75 ohm line 1 for use with E1	coaxial	straight	n/a	n/a	straight coaxial cable	A-20
120 ohm line 1 for use with E1	DB-9	straight	n/a	n/a	DB-9 straight cable	A-18
		crossover	n/a	n/a	DB-9 crossover cable	A-19
power supply board	power connector		A0674892	NTAU32AA	power harness for DVEM	

Note: Refer to Appendix D for twisted pair cable information (DSX-1 interface).

Table A-3. Cable Selection for Analog Voice Modules

Port	Connector	Type of Interface	CPC No.	Engineering code	Connects to....	Page No.
E&M	RJ-48C	straight	A0671273	NTMU88AA	straight male-lugs	A-20
FXS/FXO	RJ-11	straight	A0670512	NTMR38AA	straight male-male	A-20

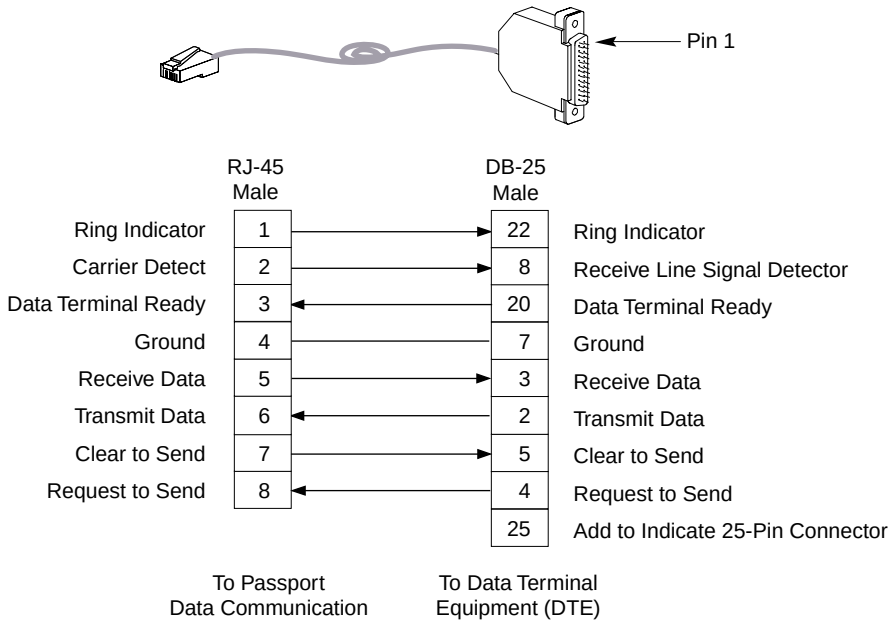


Figure A-1. Cable NTAU17AA - Passport 4430, 4450, 4455 to DTE Equipment

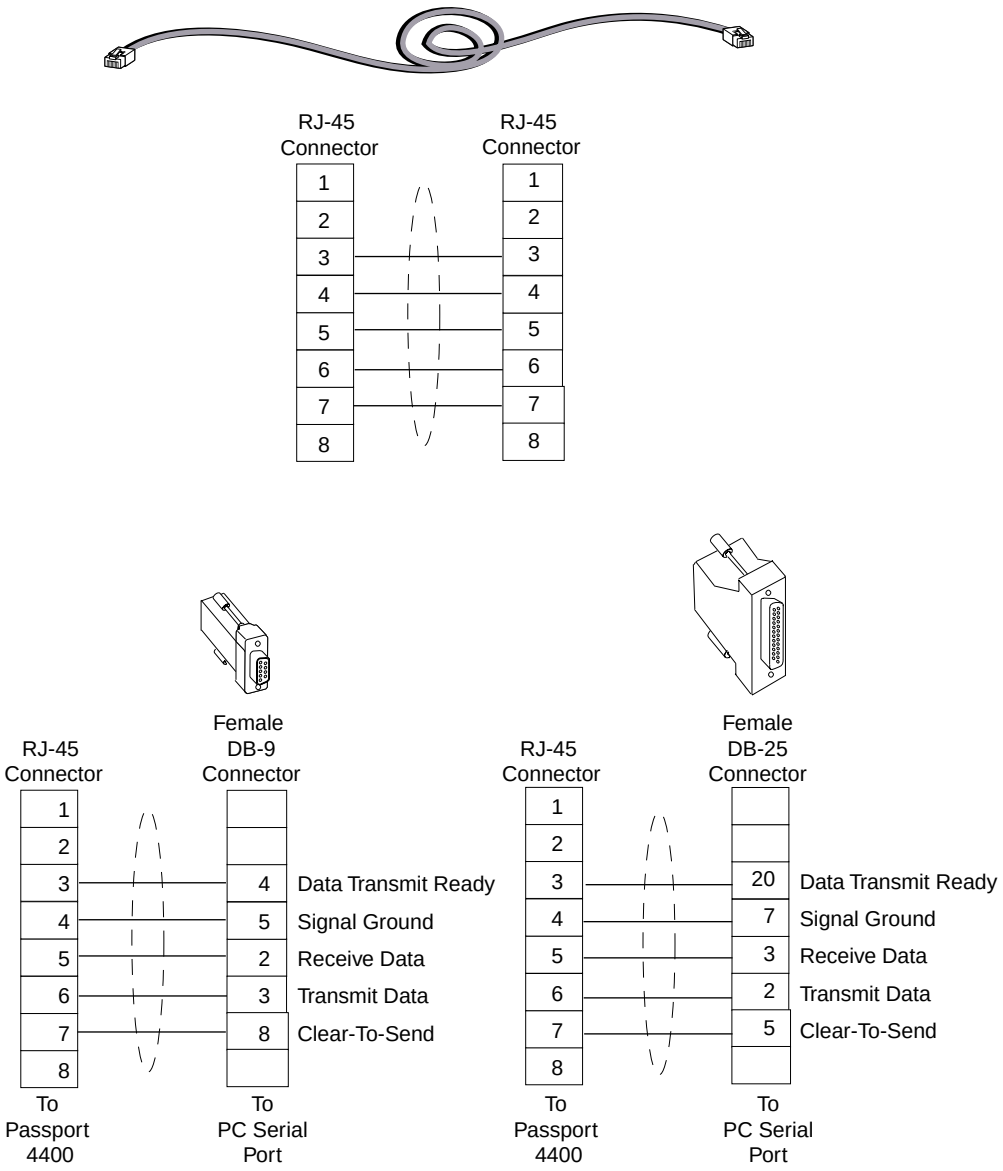


Figure A-2. NT0227AA Management Cable

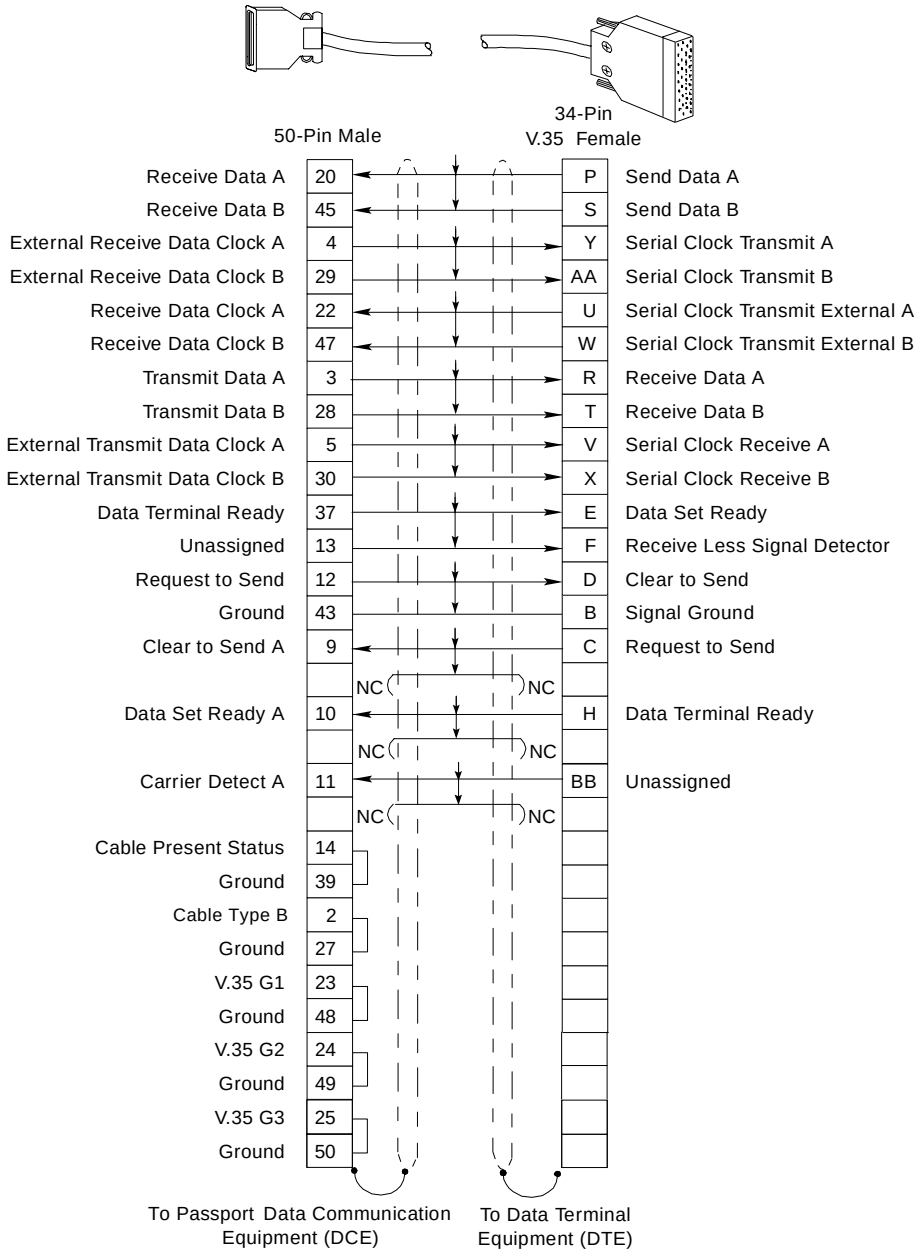

50-Pin Male
34-Pin
V.35 Female
Receive Data A 20 P Send Data A
Receive Data B 45 S Send Data B
External Receive Data Clock A 4 Y Serial Clock Transmit A
External Receive Data Clock B 29 AA Serial Clock Transmit B
Receive Data Clock A 22 U Serial Clock Transmit External A
Receive Data Clock B 47 W Serial Clock Transmit External B
Transmit Data A 3 R Receive Data A
Transmit Data B 28 T Receive Data B
External Transmit Data Clock A 5 V Serial Clock Receive A
External Transmit Data Clock B 30 X Serial Clock Receive B
Data Terminal Ready 37 E Data Set Ready
Unassigned 13 F Receive Less Signal Detector
Request to Send 12 D Clear to Send
Ground 43 B Signal Ground
Clear to Send A 9 C Request to Send
NC NC
Data Set Ready A 10 H Data Terminal Ready
NC NC
Carrier Detect A 11 BB Unassigned
NC NC
Cable Present Status 14
Ground 39
Cable Type B 2
Ground 27
V.35 G1 23
Ground 48
V.35 G2 24
Ground 49
V.35 G3 25
Ground 50
To Passport Data Communication Equipment (DCE)
To Data Terminal Equipment (DTE)

Figure A-3. Cable NTAU21AA - Passport 4430, 4450, 4455 to DTE Equipment

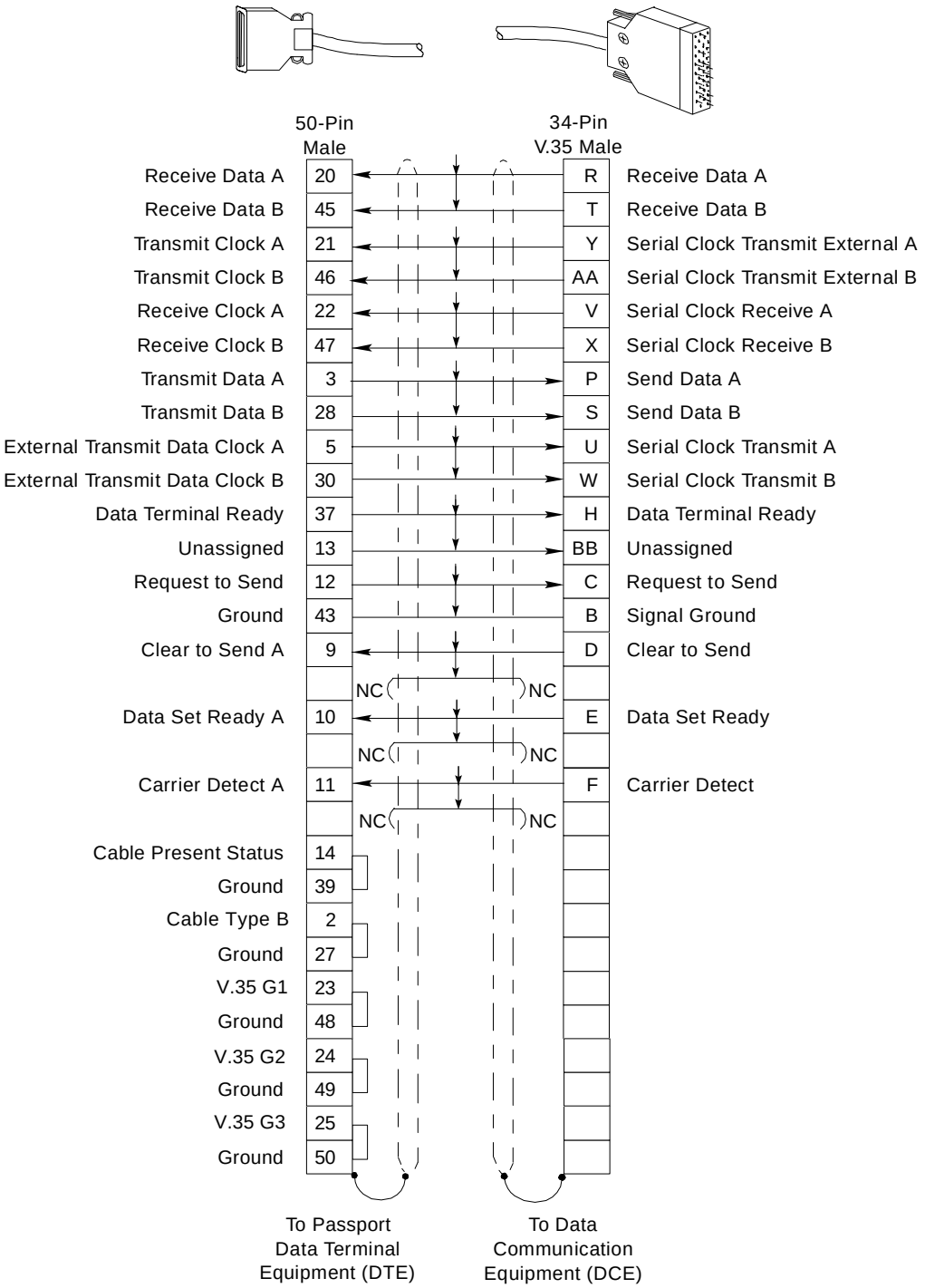

50-Pin Male
34-Pin V.35 Male
Receive Data A 20 R Receive Data A
Receive Data B 45 T Receive Data B
Transmit Clock A 21 Y Serial Clock Transmit External A
Transmit Clock B 46 AA Serial Clock Transmit External B
Receive Clock A 22 V Serial Clock Receive A
Receive Clock B 47 X Serial Clock Receive B
Transmit Data A 3 P Send Data A
Transmit Data B 28 S Send Data B
External Transmit Data Clock A 5 U Serial Clock Transmit A
External Transmit Data Clock B 30 W Serial Clock Transmit B
Data Terminal Ready 37 H Data Terminal Ready
Unassigned 13 BB Unassigned
Request to Send 12 C Request to Send
Ground 43 B Signal Ground
Clear to Send A 9 D Clear to Send
NC NC
Data Set Ready A 10 E Data Set Ready
NC NC
Carrier Detect A 11 F Carrier Detect
NC NC
Cable Present Status 14
Ground 39
Cable Type B 2
Ground 27
V.35 G1 23
Ground 48
V.35 G2 24
Ground 49
V.35 G3 25
Ground 50
To Passport Data Terminal Equipment (DTE)
To Data Communication Equipment (DCE)

Figure A-4. Cable NTAU20AA - Passport 4430, 4450, 4455 to DCE Equipment

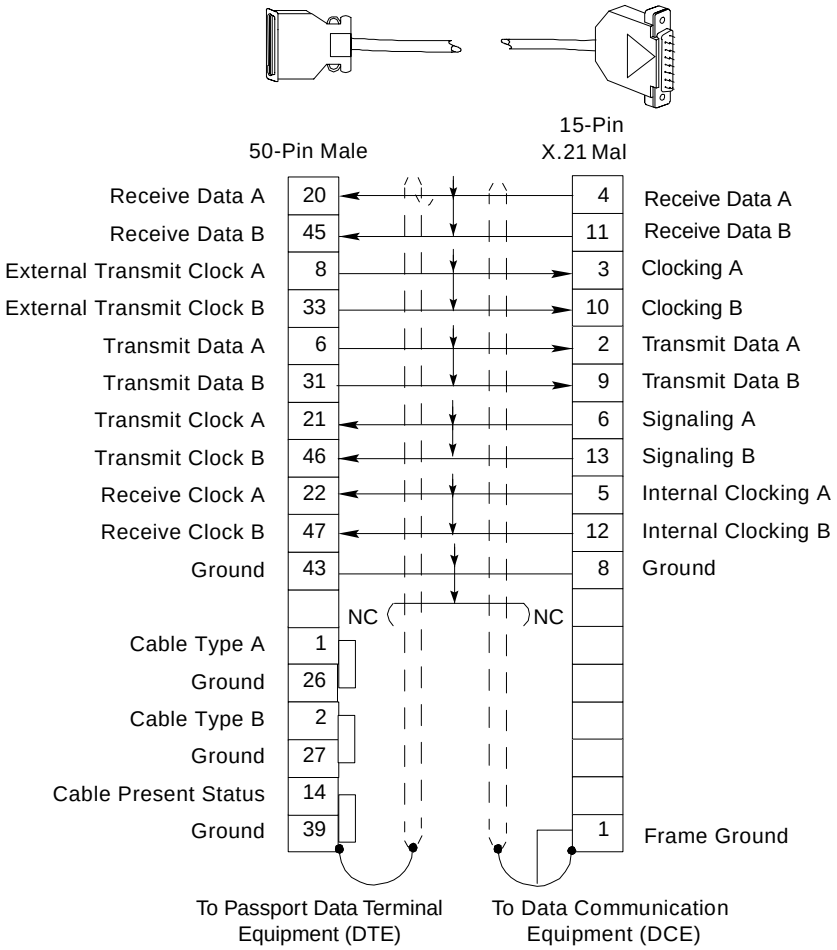


Figure A-5. Cable NTAU26AA - Passport 4430, 4450, 4455 to DCE Equipment

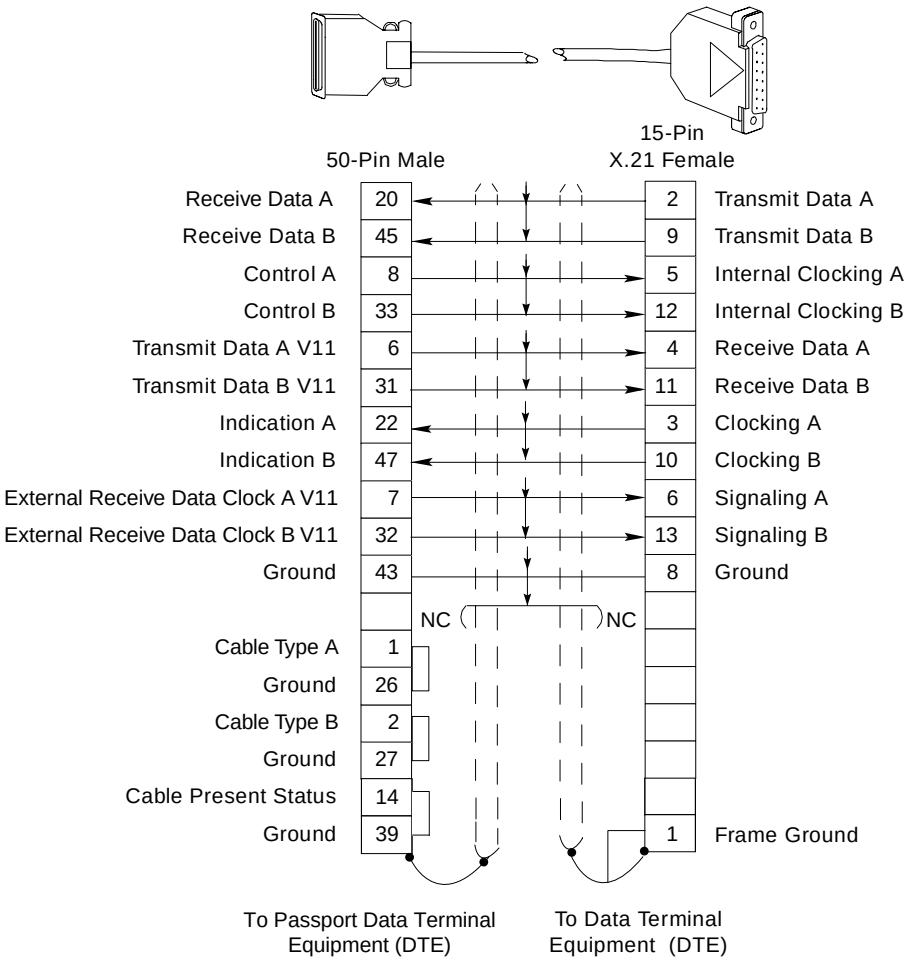


Figure A-6. Cable NTAU27AA - Passport 4430, 4450, 4455 to DTE Equipment

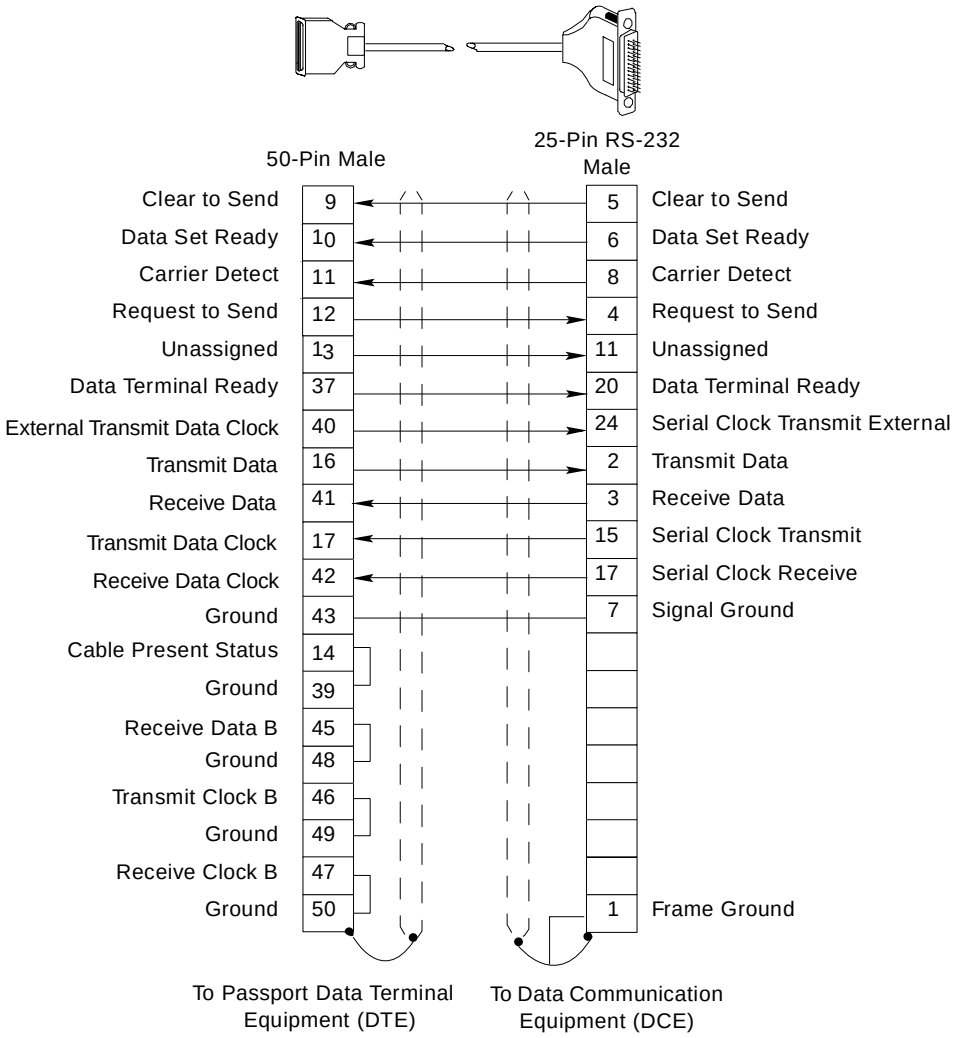

50-Pin Male
25-Pin RS-232 Male
Clear to Send 9 5 Clear to Send
Data Set Ready 10 6 Data Set Ready
Carrier Detect 11 8 Carrier Detect
Request to Send 12 4 Request to Send
Unassigned 13 11 Unassigned
Data Terminal Ready 37 20 Data Terminal Ready
External Transmit Data Clock 40 24 Serial Clock Transmit External
Transmit Data 16 2 Transmit Data
Receive Data 41 3 Receive Data
Transmit Data Clock 17 15 Serial Clock Transmit
Receive Data Clock 42 17 Serial Clock Receive
Ground 43 7 Signal Ground
Cable Present Status 14
Ground 39
Receive Data B 45
Ground 48
Transmit Clock B 46
Ground 49
Receive Clock B 47
Ground 50 1 Frame Ground
To Passport Data Terminal Equipment (DTE)
To Data Communication Equipment (DCE)

Figure A-7. Cable NTAU18AA - Passport 4430, 4450, 4455 to DCE Equipment

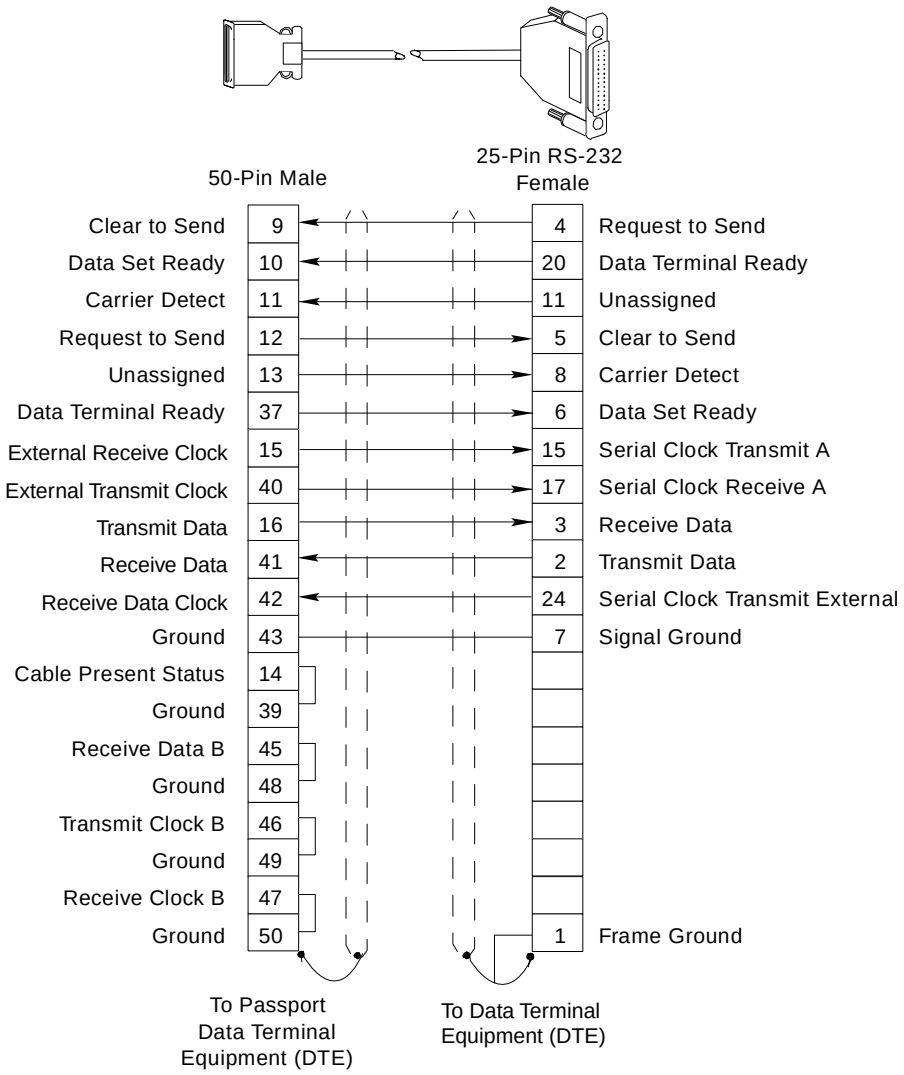

50-Pin Male
25-Pin RS-232
Female
Clear to Send 9 4 Request to Send
Data Set Ready 10 20 Data Terminal Ready
Carrier Detect 11 11 Unassigned
Request to Send 12 5 Clear to Send
Unassigned 13 8 Carrier Detect
Data Terminal Ready 37 6 Data Set Ready
External Receive Clock 15 15 Serial Clock Transmit A
External Transmit Clock 40 17 Serial Clock Receive A
Transmit Data 16 3 Receive Data
Receive Data 41 2 Transmit Data
Receive Data Clock 42 24 Serial Clock Transmit External
Ground 43 7 Signal Ground
Cable Present Status 14
Ground 39
Receive Data B 45
Ground 48
Transmit Clock B 46
Ground 49
Receive Clock B 47
Ground 50 1 Frame Ground
To Passport
Data Terminal
Equipment (DTE)
To Data Terminal
Equipment (DTE)

Figure A-8. Cable NTAU19AA - Passport 4430, 4450, 4455 to DTE Equipment

Note: This cable sets the CTS high, regardless of the idle character setting. You can use cable NT0263AA (Figure A-9.) in place of cable NTAU19AA.

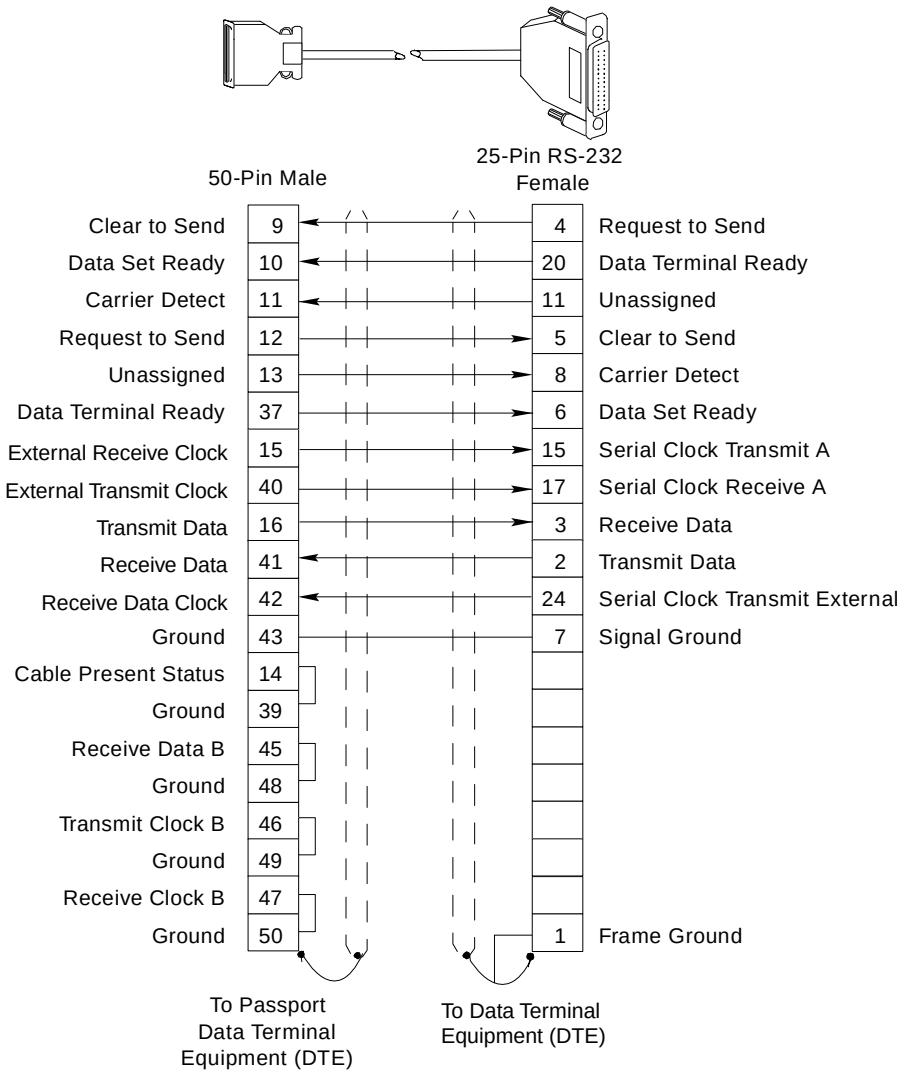
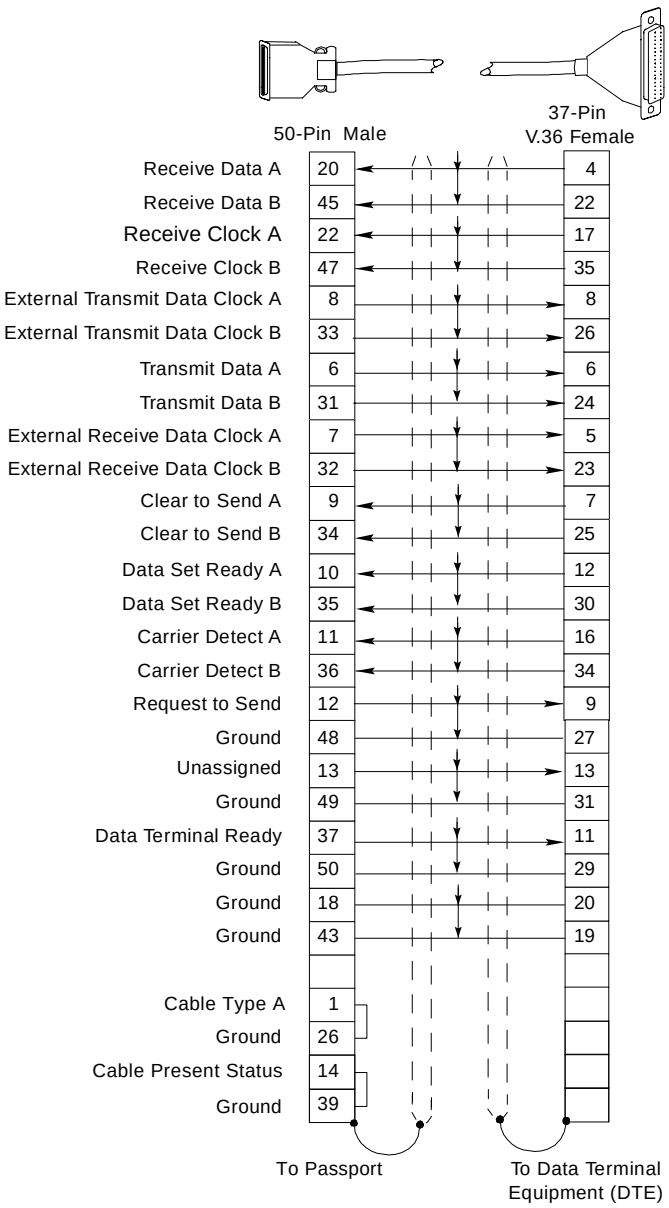
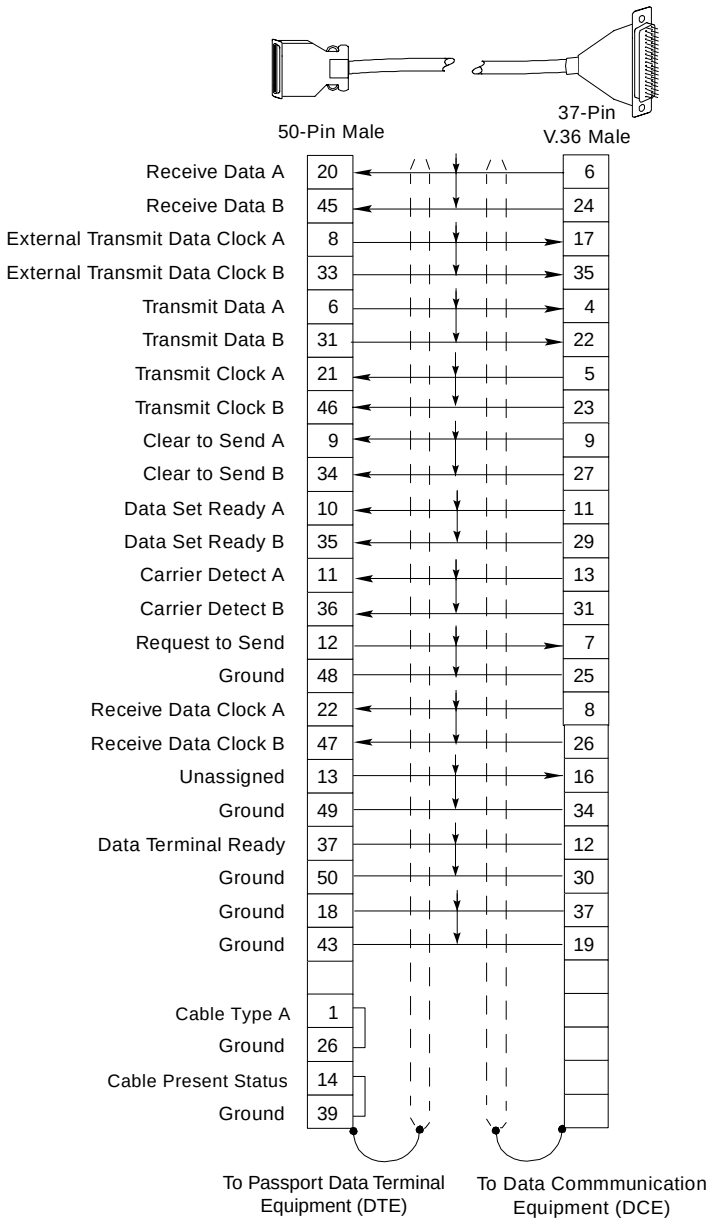

50-Pin Male
25-Pin RS-232
Female
Clear to Send 9 4 Request to Send
Data Set Ready 10 20 Data Terminal Ready
Carrier Detect 11 11 Unassigned
Request to Send 12 5 Clear to Send
Unassigned 13 8 Carrier Detect
Data Terminal Ready 37 6 Data Set Ready
External Receive Clock 15 15 Serial Clock Transmit A
External Transmit Clock 40 17 Serial Clock Receive A
Transmit Data 16 3 Receive Data
Receive Data 41 2 Transmit Data
Receive Data Clock 42 24 Serial Clock Transmit External
Ground 43 7 Signal Ground
Cable Present Status 14
Ground 39
Receive Data B 45
Ground 48
Transmit Clock B 46
Ground 49
Receive Clock B 47
Ground 50 1 Frame Ground
To Passport
Data Terminal
Equipment (DTE)
To Data Terminal
Equipment (DTE)

Figure A-9. Cable NT0263AA - Passport 4430, 4450, 4455 to DTE Equipment


50-Pin Male
37-Pin
V.36 Female
Receive Data A 20 4
Receive Data B 45 22
Receive Clock A 22 17
Receive Clock B 47 35
External Transmit Data Clock A 8 8
External Transmit Data Clock B 33 26
Transmit Data A 6 6
Transmit Data B 31 24
External Receive Data Clock A 7 5
External Receive Data Clock B 32 23
Clear to Send A 9 7
Clear to Send B 34 25
Data Set Ready A 10 12
Data Set Ready B 35 30
Carrier Detect A 11 16
Carrier Detect B 36 34
Request to Send 12 9
Ground 48 27
Unassigned 13 13
Ground 49 31
Data Terminal Ready 37 11
Ground 50 29
Ground 18 20
Ground 43 19
Cable Type A 1
Ground 26
Cable Present Status 14
Ground 39
To Passport
To Data Terminal Equipment (DTE)

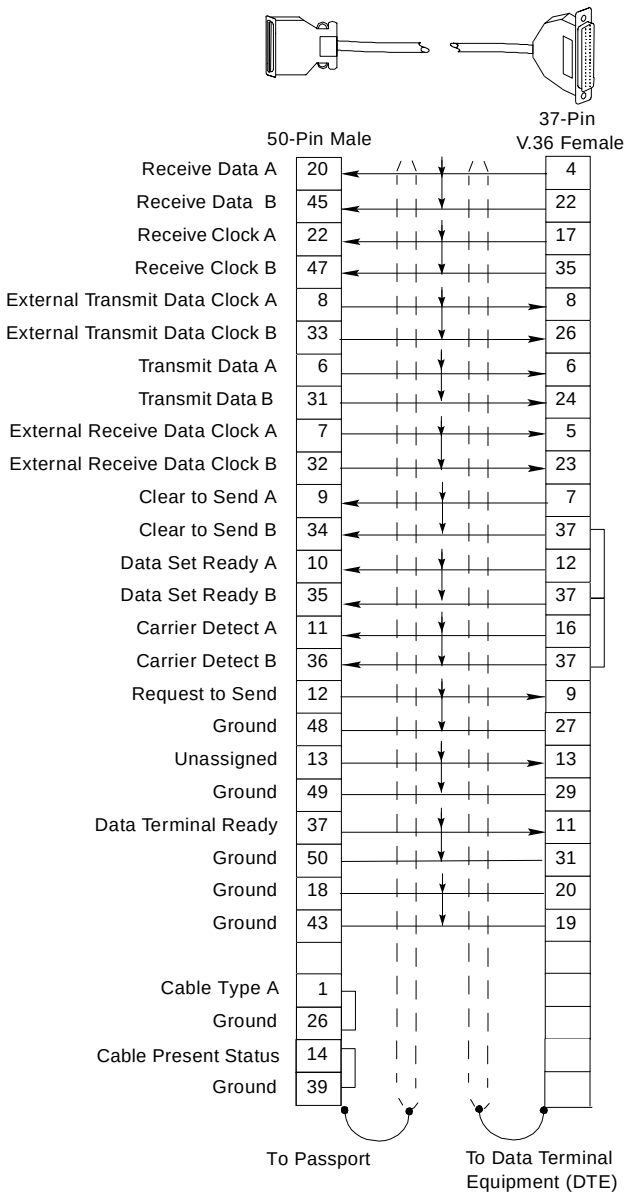
Type 1 Cables: Receivers shall have both input terminals connected to individual terminals at the load interchange point, independent of all other receivers.

Figure A-10. Cable NTAU23AA - Passport 4430, 4450, 4455 to DTE Equipment


50-Pin Male
37-Pin
V.36 Male
Receive Data A 20 6
Receive Data B 45 24
External Transmit Data Clock A 8 17
External Transmit Data Clock B 33 35
Transmit Data A 6 4
Transmit Data B 31 22
Transmit Clock A 21 5
Transmit Clock B 46 23
Clear to Send A 9 9
Clear to Send B 34 27
Data Set Ready A 10 11
Data Set Ready B 35 29
Carrier Detect A 11 13
Carrier Detect B 36 31
Request to Send 12 7
Ground 48 25
Receive Data Clock A 22 8
Receive Data Clock B 47 26
Unassigned 13 16
Ground 49 34
Data Terminal Ready 37 12
Ground 50 30
Ground 18 37
Ground 43 19
Cable Type A 1
Ground 26
Cable Present Status 14
Ground 39
To Passport Data Terminal Equipment (DTE)
To Data Commmunication Equipment (DCE)

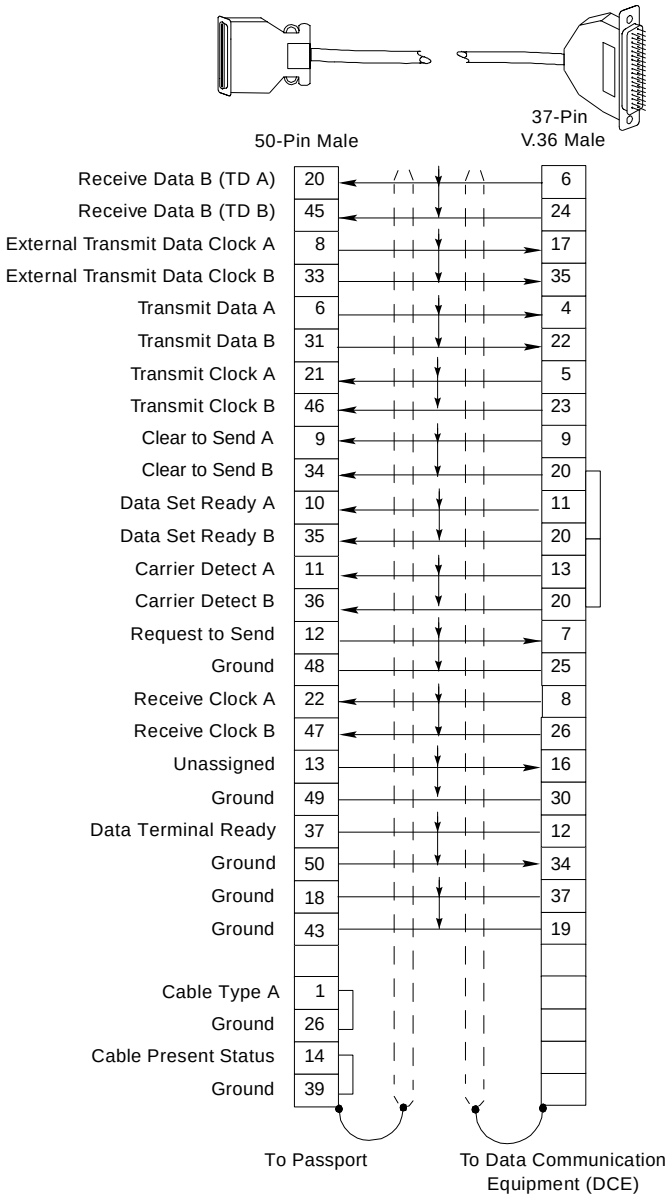
This cable is intended for use in data transfer between the Passport 4430, 4450, 4455 system and V.36 DCE utilizing V.11 drivers for control signals (category I).

Figure A-11. Cable NTAU22AA - Passport 4430, 4450, 4455 to DCE Equipment


50-Pin Male
37-Pin
V.36 Female
Receive Data A 20 4
Receive Data B 45 22
Receive Clock A 22 17
Receive Clock B 47 35
External Transmit Data Clock A 8 8
External Transmit Data Clock B 33 26
Transmit Data A 6 6
Transmit Data B 31 24
External Receive Data Clock A 7 5
External Receive Data Clock B 32 23
Clear to Send A 9 7
Clear to Send B 34 37
Data Set Ready A 10 12
Data Set Ready B 35 37
Carrier Detect A 11 16
Carrier Detect B 36 37
Request to Send 12 9
Ground 48 27
Unassigned 13 13
Ground 49 29
Data Terminal Ready 37 11
Ground 50 31
Ground 18 20
Ground 43 19
Cable Type A 1
Ground 26
Cable Present Status 14
Ground 39
To Passport
To Data Terminal Equipment (DTE)

This cable is intended for use in data transfer between the Passport 4430, 4450, 4455 system and V.36 DTE utilizing V.10 drivers for control signals (category II).

Figure A-12. Cable NTAU25AA - Passport 4430, 4450, 4455 to DTE Equipment


50-Pin Male
37-Pin
V.36 Male
Receive Data B (TD A) 20 6
Receive Data B (TD B) 45 24
External Transmit Data Clock A 8 17
External Transmit Data Clock B 33 35
Transmit Data A 6 4
Transmit Data B 31 22
Transmit Clock A 21 5
Transmit Clock B 46 23
Clear to Send A 9 9
Clear to Send B 34 20
Data Set Ready A 10 11
Data Set Ready B 35 20
Carrier Detect A 11 13
Carrier Detect B 36 20
Request to Send 12 7
Ground 48 25
Receive Clock A 22 8
Receive Clock B 47 26
Unassigned 13 16
Ground 49 30
Data Terminal Ready 37 12
Ground 50 34
Ground 18 37
Ground 43 19
Cable Type A 1
Ground 26
Cable Present Status 14
Ground 39
To Passport
To Data Communication Equipment (DCE)

This cable is intended for use in data transfer between the Passport 4430, 4450, 4455, system and V.36 DCE utilizing V.10 drivers for control signals (category II).

Figure A-13. Cable NTAU24AA - Passport 4430, 4450, 4455 to DCE Equipment

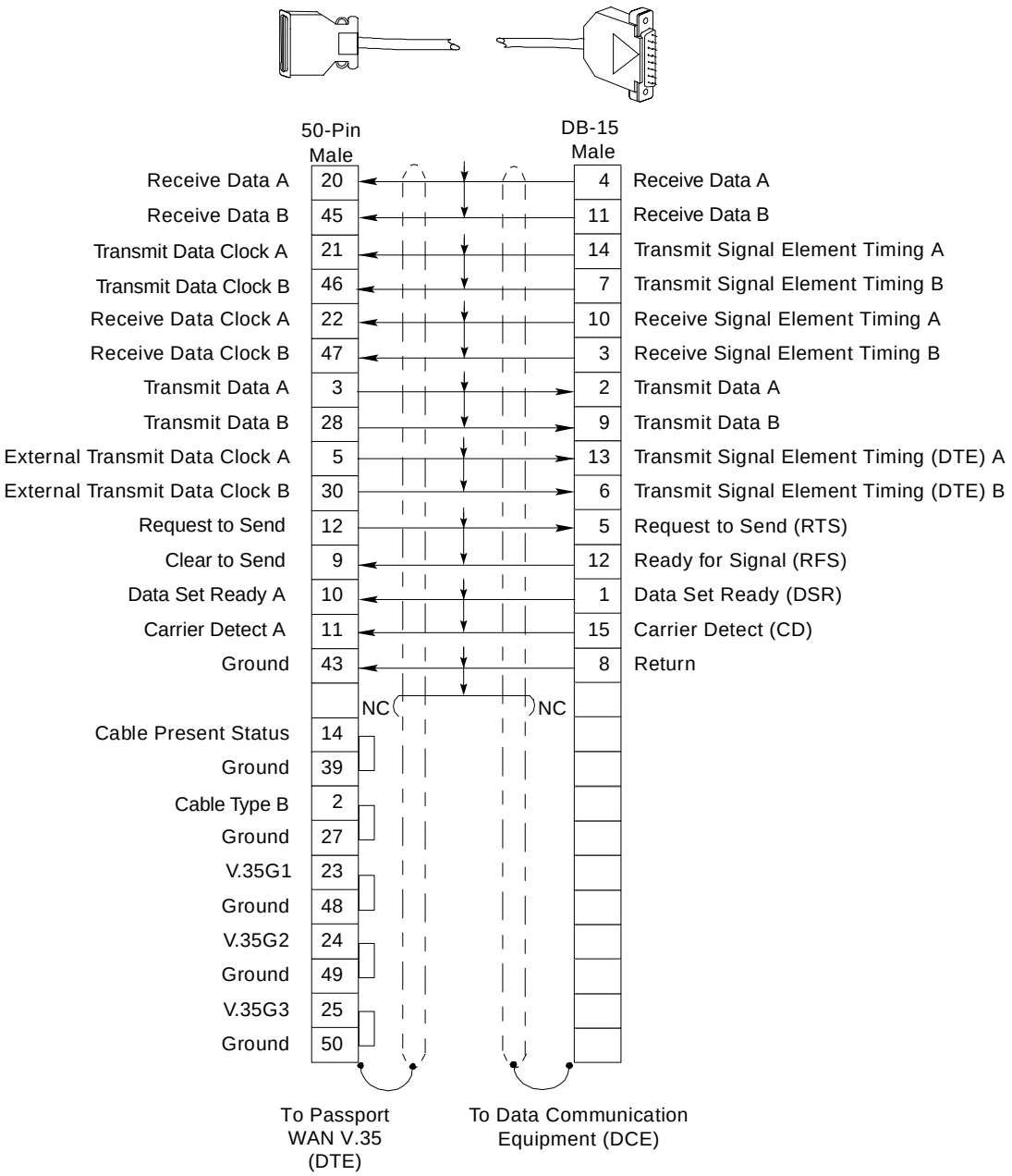

50-Pin Male
DB-15 Male
Receive Data A 20 4 Receive Data A
Receive Data B 45 11 Receive Data B
Transmit Data Clock A 21 14 Transmit Signal Element Timing A
Transmit Data Clock B 46 7 Transmit Signal Element Timing B
Receive Data Clock A 22 10 Receive Signal Element Timing A
Receive Data Clock B 47 3 Receive Signal Element Timing B
Transmit Data A 3 2 Transmit Data A
Transmit Data B 28 9 Transmit Data B
External Transmit Data Clock A 5 13 Transmit Signal Element Timing (DTE) A
External Transmit Data Clock B 30 6 Transmit Signal Element Timing (DTE) B
Request to Send 12 5 Request to Send (RTS)
Clear to Send 9 12 Ready for Signal (RFS)
Data Set Ready A 10 1 Data Set Ready (DSR)
Carrier Detect A 11 15 Carrier Detect (CD)
Ground 43 8 Return
NC NC
Cable Present Status 14
Ground 39
Cable Type B 2
Ground 27
V.35G1 23
Ground 48
V.35G2 24
Ground 49
V.35G3 25
Ground 50
To Passport WAN V.35 (DTE)
To Data Communication Equipment (DCE)

Figure A-14. Cable NTAU30AA - Passport 4430, 4450, 4455 to Passport 6400 DCE (V.35) Direct Connect to Passport Switch Fanout Panel

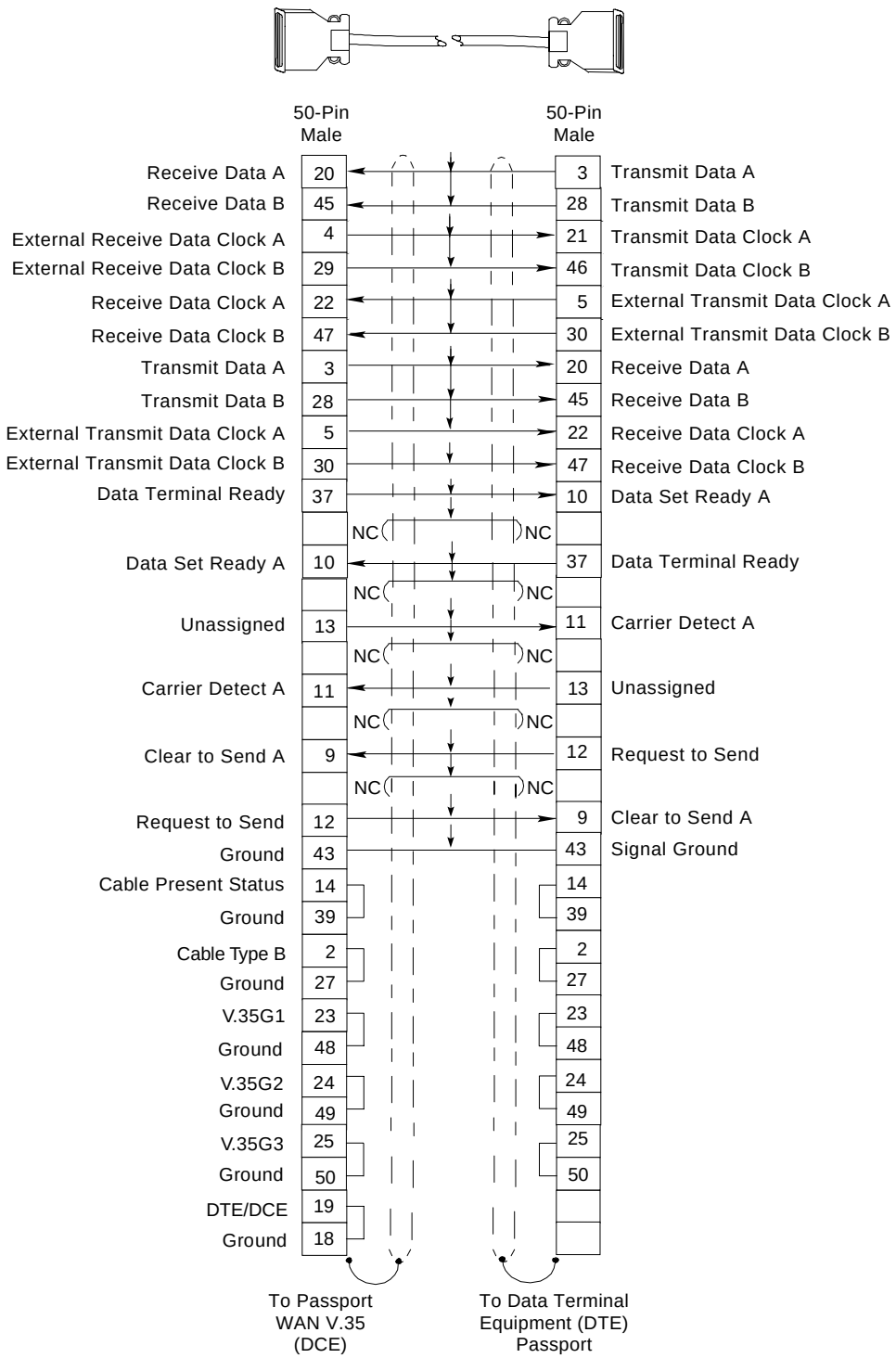

50-Pin Male
50-Pin Male
Receive Data A 20 3 Transmit Data A
Receive Data B 45 28 Transmit Data B
External Receive Data Clock A 4 21 Transmit Data Clock A
External Receive Data Clock B 29 46 Transmit Data Clock B
Receive Data Clock A 22 5 External Transmit Data Clock A
Receive Data Clock B 47 30 External Transmit Data Clock B
Transmit Data A 3 20 Receive Data A
Transmit Data B 28 45 Receive Data B
External Transmit Data Clock A 5 22 Receive Data Clock A
External Transmit Data Clock B 30 47 Receive Data Clock B
Data Terminal Ready 37 10 Data Set Ready A
NC NC
Data Set Ready A 10 37 Data Terminal Ready
NC NC
Unassigned 13 11 Carrier Detect A
NC NC
Carrier Detect A 11 13 Unassigned
NC NC
Clear to Send A 9 12 Request to Send
NC NC
Request to Send 12 9 Clear to Send A
Ground 43 43 Signal Ground
Cable Present Status 14 14
Ground 39 39
Cable Type B 2 2
Ground 27 27
V.35G1 23 23
Ground 48 48
V.35G2 24 24
Ground 49 49
V.35G3 25 25
Ground 50 50
DTE/DCE 19
Ground 18
To Passport WAN V.35 (DCE)
To Data Terminal Equipment (DTE) Passport

Figure A-15. Cable NTBQ99AA - Passport 4430, 4450, 4455 to Passport DTE (V.35) Equipment

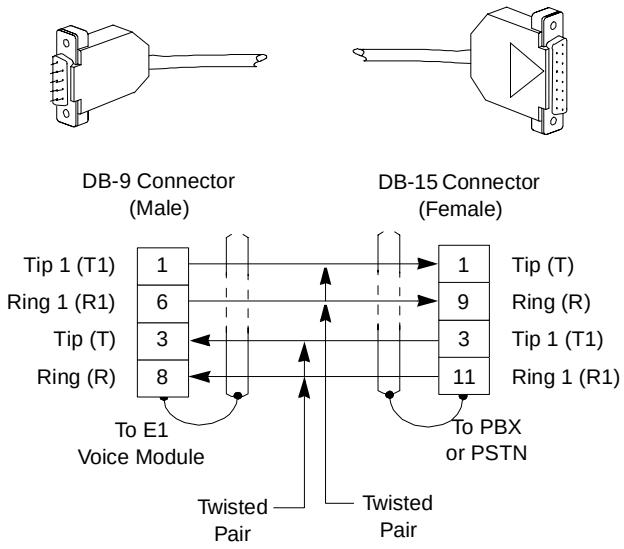


Figure A-16. 120 ohm Straight Cable

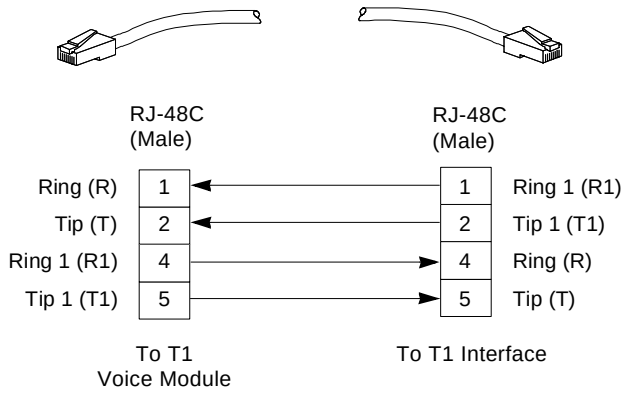


Figure A-17. Cable NTML79AA - Modular Straight Cable

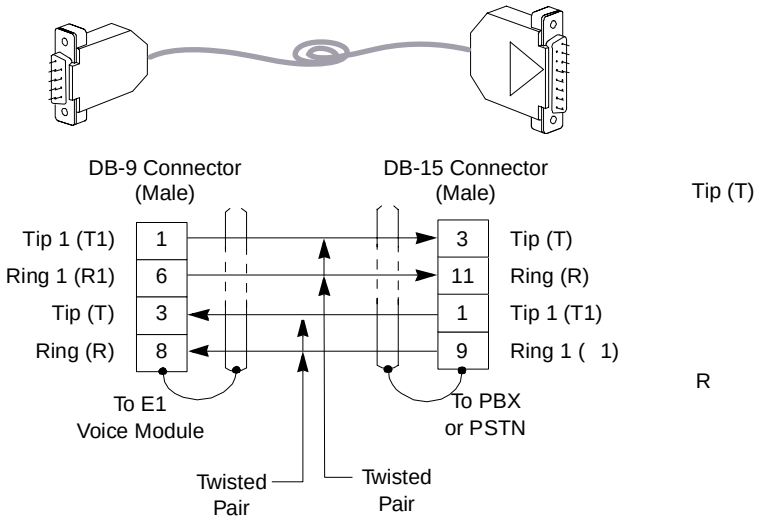


Figure A-18. 120 ohm Crossover Cable

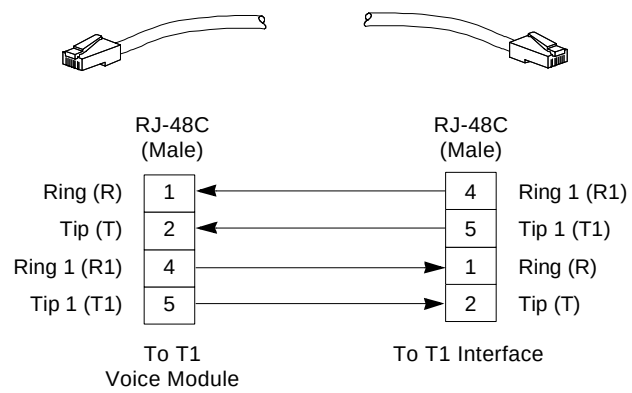


Figure A-19. Cable NTMV09AA - Modular Crossover Cable

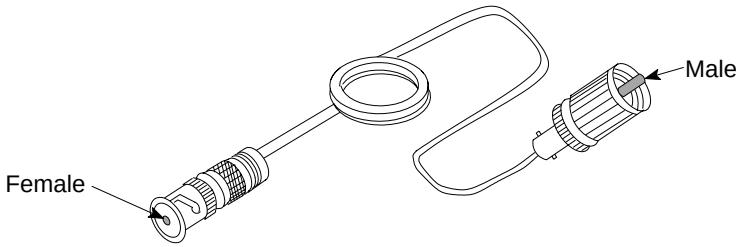


Figure A-20. Coaxial Cable

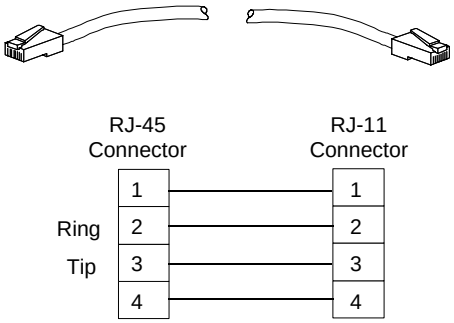


Figure A-21. Cable NTMR38AA - Modular Straight Cable

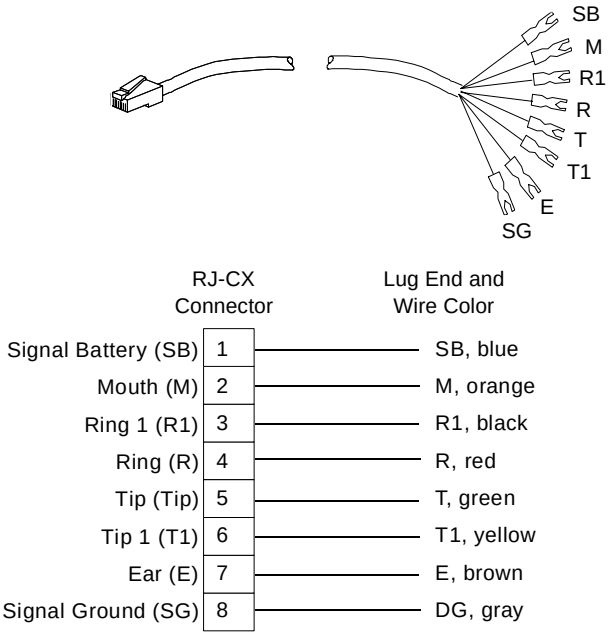


Figure A-22. Cable NTMU88AA - Modular Cable to Lugs

Regulatory and Telephone Company Requirements B

This chaper describes the Regulatory Requirements and Telephone Company Requirements necessary for connecting to a telephone network and operating your Passport 4400 unit (4430/4450/4455).

Regulatory Requirements

Notice of Electromagnetic Compatibility (EMC)

The following label certifies that, when installed in an approved chassis, the voice/fax module meets EMC Level A of the EN55022 Standard. This label is also affixed to the voice module.

> ⚠ ***Warning:*** This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

In addition to the EMC Standard, this module meets and complies with the EN 50082 Immunity Standard.

Safety Information

Before performing any of the procedures included in this chapter, read the safety information below.

Underwriters Laboratories, Inc. (UL), for North America, (TÜV) for Germany, and (C-UL) for France request that the following statements of warning be made in three languages to help in the safe operation of the unit.

Caution	***Achtung***	***Avis***
To ensure adequate cooling of the equipment a 2.0 inch unobstructed space must be maintained around all sides of the unit.	Um die Kühlung des Gerätes nicht zu beschränken, ist es notwendig um das Gerät herum an allen Seiten ca 5 cm Raum zu lassen.	Pour assurer un refroidissement adéquat, maintenir un espace libre de 5 cm (2 pouces) tout autour de l'appareil.
The ac power socket shall be installed near the equipment and shall be easily accessible.	Stellen Sie das Gerät in der Nähe einer geerdeten Schutzkontakt- steckdose so auf, dass diese leicht erreichbar und zugänglich ist.	Installer la prise AC à proximité de l'appareil, dans un rayon d'accès facile.
Installation and access to the interior of this unit shall be made only by a qualified technician.	Die Montage und der Zugang ins Innere des Gerätes sind nur einem qualifizierten Techniker gestattet.	L'installation et l'ouverture de cet appareil est permise par un technicien autorisé seulement.
Connection to the network is to be disconnected before the (mains) plug is removed.	Ehe der Netzstecker aus der Steckdose gezogen wird, müssen sämtliche äusserliche Verbindungen vom Gerät getrennt werden.	Avant de débrancher la prise de courant, assurer que toutes les connexions externes ont été déconnecté de l'appareil.
Warning	***Warnung***	***Avertissement***
Remove power plug from the power socket before performing any service work on the unit.	Vor öffnen des Gerätes, muss der Netzstecker aus der Steckdose gezogen werden.	Débrancher la prise de courant avant d'entreprendre aucun travail de réparation de l'appareil.
The power supply is auto-ranging in this model.	Netzteil ist mit automatischer Umschaltung entsprechend der Versorgungsspannung versorgt.	Ce modèle s'adapte automatique- ment au courant électrique ou voltage de la prise murale.
The power supply cordset to be supplied in Europe must have 0.75^2mm, 3 conductor "HAR" cord type H05VV-F, terminated in a grounding type Shucko plug on one end and a molded-on IEC 320 connector on the other end.	Die Netzleitung sollte ein harmonisierter Typ (HAR) sein, mit der Bezeichnung H05VV-F oder H05VVH2-F, 3G 0.75^2mm, mit einem Schutzkontakt - und einem Kaltgerätestecker (IEC 320).	En Europe, brancher l'appareil à la prise murale au moyen d'un fil "HAR" comprenant 3 cables H05VV-F ou H05VVH2-F de 0.75^2mm chacun, avec à une extremité une prise de terre genre SHUCKO et à l'autre une prise IEC 320.
Technical Data	***Technische Daten***	***Donnees Techniques***
Passport 4400 Series ac units Input Voltage: 100-240 Vac -5%, +10% Input Current: 3A/1.5A Frequency: 47-63 Hz dc units Input Voltage: 36-72 Vdc Input Current: 5A	Passport 4400 Series ac Geraete Nennspannung: 100-240 V~ -5%, +10% Nennstrom: 3A/1.5A Frequenz: 47-63 Hz dc Geraete Nennspannung: 36-72 V Nennstrom: 5A	Passport 4400 Series ac appareils Voltage d'Accès: 100-240 V~ -5%, +10% Courant d'Accès: 3A/1.5A Fréquence: 47-63 Hz dc appareils Voltage d'Accès: 36-72 V Courant d'Accès: 5A

Regulatory Compliances

Safety

UL 1950: up to A3 (1995)
CSA Standard C22.2 No. 950: 1995
IEC 950: up to A3 (1995)
TÜV: EN60950, up to A3 (1995)
EN41003:1993
BABT 340 (where applicable):Seventh Edition (Manufacturing)

Electromagnetic Compatibility

FCC Part 15, Class A (T1 only)
C.R.C., c, 1374 (T1 only)
CISPR 22, Class A
IEC 801-2:1991/prEN55024-2:1992, 3KV, CD, 8KV DA
IEC 801-3:1984/prEN55024-3:1991, 3 V/m
IEC 801-3:1988/prEN55024-4:1993, 0.5KV Signal, 1KV Power
EN55022:1994 Class A
EN50082-1, -2, -3, -4:1995
EN60555 Power Harmonics

Telephone Registration (as applicable)

See individual modules for compliance.

EU Declaration of Conformity

Safety: Directive 73/23/EEC
EMC: Directive 89/336/EEC
Telecom Terminal Equipment: R&TTE: Directive 1999/5/EC

T1 Voice Module (TVM) and E1 Voice Module (EVM)

The following pertains to the T1 and E1 Voice Modules as part of the Passport 4400 unit.

User's Responsibility

If a need arises in the future, the telephone company will call you and request the following information:

- Manufacturer of the device: Nortel Networks
- Engineering code, description and model number of the device

Passport Description	Engineering Code	Number used for Agency
T1 Voice Module (TVM/1E)	NTAY99AA	5000TAM/1E, Rev. K or later (assembly # 100-3533-004, Rev. K)
T1 Voice Module (TVM/2)	NTAY14AA	5000TAM/2, Rev. M or later (assembly # 100-3533-001, Rev. M)
E1 Voice Module (EVM/1)	NTAY15AA	5000EAM/1E, Rev. K or later (assembly # 100-3545-004, Rev. D)
E1 Voice Module (EVM/2)	NTAY16AA	5000EAM/2, Rev. K or later (assembly # 100-3545-001, Rev. K)
Digital Voice Expansion Module - 12 Channels (DVEM/12 for TVM/EVM)	NTAY18AA (requires DVEM Power Cable Harness NTAU32AA)	5000DVEM/12
DVM/1 - Single Channel Digital Voice SIMM Module	NTAU60AA	5000DVM/1
DVM/6 - 6 Single Channel Digital Voice SIMM Modules	NTBQ54AA	5000DVM/6
DVM/12 - 12 Single Channel Digital Voice SIMM Modules	NTBQ55AA	5000DVM/12

Type of Interface:	T1	1.544 digital interface with D4 framing format 1.544 digital interface with ESF framing format
	E1	2.048 Mbps digital interface
Connectors Provided:	T1	RJ-48C (2)
	E1	75 ohms BNC (4) 120 ohms DB-9 (1)
Facility Interface Code (FIC:	T1	04DU9-BN 04DU9-DN 04DU9-1KN 04DU9-1SN
	E1	See individual interface
Service Order Code:	6.0F (T1)	

Telecommunication Requirements

T1

Refer to Appendix C for information about Telecommunication Requirements.

User Responsibility:

- FCC Part 68 (U.S.A.) - see label on module for registration.
- DOC CS-03 (Canada)
- Whether the notification is about a connection or disconnection.
- The manufacturer of the device - Nortel Networks.
- Model number of the device.

E1

Compliant to CTR-13 for 120 ohm line and NTR-4 for for 75 ohm line.

Analog Voice Modules (AVM, UAVM)

User's Responsibility

If a need arises in the future, the telephone company will call you and request the following information:

- Manufacturer of the device: Nortel Networks
- Model number of the device(s):

Passport Description (see note) (for EU only)	Engineering Code	Name for Agency (EU)
Analog Voice Module, single channel (AVM/1)	NTAU61AA	5000CVM/1
Analog Voice Module, dual channel (AVM/2)	NTAU62AA	5000CVM/2
Universal Analog Voice Module, dual channel (UAVM/2)	NTAU50AA	5000UVM
FXO Voice Interface Module for FXO (for UAVM/2). Approved for Spain, Sweden, Switzerland, Netherlands, France, U.K. and Germany.	NTLN23AA	5000V/XOL
E&M Voice Interface Module for E&M (for UAVM/2)	NTAY09AA	5000V/EM+
FXS Voice Interface Module for FXS (for UAVM/2)	NTAY12AA	5000V/XSL

Note: The EU country-wide label with registration number is applied to the Passport 4400 unit chassis.
FXO (FXO interface) used in Spain - The manual/automatic dialing of international calls may fail when using this apparatus.
La marcación manual/automática de números internacionales con este equipo terminal puede llegar a ser infructuosa.

- FCC Part 68 (U.S.A): BEBUSA 75539-PX-N (AVM: all, UAVM: FXO and E&M only)
- DOC CS-03 (Canada): AVM: 5681A (1 ch) and 7073A (2 ch), UAVM: 680-5681A (FXO and E&M interfaces only)
- Connectors, Facility Interface Codes, Service Order Codes, and Ringer Equivalence: See below.

AVM E&M (CVM)

USO Connector:	RJ-45CX
Facility Interface Code:	• TL11M/E 2-Wire • TL12M/E 2-Wire • TL31M/E 4-Wire • TL32M/E 4-Wire

AVM FXS (CVM)

USO Connector:	RJ-11C/W
Facility Interface Code:	OL13C 2-Wire
Service Order Code:	9.0F

AVM FXO (CVM)

USO Connector:	RJ-11C/W
Facility Interface Code:	O2LS2 2-Wire
Service Order Code:	9.0F
Ringer Equivalence:	0.9B

UAVM FXO (TUVM)

USO Connector:	RJ-11C
Ringer Equivalence:	0.9B

Registration

UAVM only: The FXO and E&M interfaces are registered with the FCC based upon compliance with Part 68 of its rules. The FXS interface is not registered with the FCC, therefore, this interface cannot be connected to the public network. FCC registration does not constitute an expressed or implied guarantee of performance. Only the warranty set forth in this manual covers the performance of this equipment.

Warning	Warnung
The connection to the public network is performed via a supplied RJ12-TAE 6F cable. No other device can be connected to that line.	Der Anschluss an das Waehlnetz der Deutschen TELEKOM AG erfolgt mittels eines beigefuegten RJ12-TAE 6F Kabels. Die Konfiguration sieht vor, dass kein Geraet an den TAE F Anschluss moeglich ist.

Interface Modules

WAN Serial Interface Module

The following pertains to the WAN Serial Interface Module as part of the Passport 4400 series.

Telecommunication Requirements

Compliant to CTR-2.

56kbps CSU/DSU Interface Module

The following pertains to the 56 kbps CSU/DSU Interface Module as part of the Passport 4400 unit.

User's Responsibility

This equipment is limited for use on 56kbps lines only. If a need arises in the future, the telephone company will call you and request the following information:

- FCC Part 68 (U.S.A.) - see label on module for registration number
- DOC CS-03 (Canada)
- Whether the notification is about a connection or disconnection
- The manufacturer of the device – Nortel Networks
- Model number of the device – NTAU02AA

T1 CSU/DSU Interface Module

The following pertains to the T1 CSU/DSU Interface Module as part of the Passport 4400 unit.

User's Responsibility

This equipment is limited for use on T1 Digital Service lines only. If a need arises in the future, the telephone company will call you and request the following information:

- The manufacturer of the device – Nortel Networks
- Model number of the device – NTAU04AA
- FCC Part 68 (U.S.A. T1) – see label on module for registration number
- DOC CS-03 (Canada) – see label on module for registration number
- Type of interface – 1.544 Mbps digital with D4 or ESF framing format
- Connector – RJ-48C
- Facility interface codes:
  - 04DU9-BN
  - 04DU9-DN
  - 04DU9-1KN
  - 04DU9-1SN
- Service order code – 6.0F

ISDN TA S/T Interface Module

The following pertains to the ISDN TA S/T Interface Module as part of the Passport 4400 unit.

Telecommunication Requirements

Compliant to CTR-3 (all three layers).

ISDN TA U Interface Module

The following pertains to the ISDN TA U Interface Module as part of the Passport 4400 unit.

User's Responsibility

You must supply the following information upon request:

- FCC Part 68 (U.S.A.) - see label on module for registration number
- DOC CS-03 (Canada)
- Whether the notification is about a connection or disconnection
- The manufacturer of the device – Nortel Networks
- Model number of the device: NTAU05AA

High-Speed Data Module (HDM)

The following pertains to the High-speed Data Modules as part of the Passport 4400 unit.

Telecommunication Requirements, as part of Passport 4400 Serial Interface Modules

Compliant to CTR-2.

Legacy Data Module (LDM) and Legacy Data Expansion Module (LEM)

The following pertains to the Legacy Data Modules as part of the Passport 4400 unit.

Telecommunication Requirements, as part of Passport 4400 Serial Interface Modules

Compliant to CTR-2.

Power Supply Requirements

When your Passport 4400 unit includes more than 6 (six) digital voice modules, make sure that your installation includes a full complement of four 40-watt power supplies.

For information on power supply requirements, refer to Appendix C.

Telephone Company Requirements

Repair Instructions

If you experience trouble with this equipment, follow this procedure:

1. Determine whether the problem is your data terminal equipment. If you have another data terminal equipment, connect it in place of the inoperative unit to see if the data terminal equipment or the line is at fault.
2. If you find the problem is in your Nortel equipment, contact your customer service representative.

> ***Warning:*** Do not attempt to repair the unit. Attempting to repair the unit may cause injury, and may also damage equipment on the telephone network. Attempts to repair the unit are violations of FCC rules. Repair to this equipment can only be made by the manufacturer, and its authorized agents, and by others who may be authorized by the FCC.

The telephone company may ask you to disconnect this equipment from the network until the problem has been corrected or you are sure that the equipment is not malfunctioning.

User's Responsibility

You must supply the following information upon request:

- Whether the notification is about a connection or disconnection
- The manufacturer of the device – Nortel Networks
- Model number of the device:
  - Passport 4430AC: NTJ728AA
  - Passport 4450AC: NTJ729AA
  - Passport 4450ACR: NTJ730AA
  - Passport 4450DC: NTJ731AA
  - Passport 4450DCR: NTJ732AA

  Note: Agency approvals are for product Passport 44xx. Posted on it are model numbers NTAU08xx, NTAU09xx, NTAU10xx, NTAU12xx, NTAU13xx, where xx can be any alpha numeric value.
- FCC Part 68 (U.S.A. T1) – see label on card for registration number
- DOC CS-03 (Canada) – see label on card for registration number
- Connectors – RJ-48C or RJ-11

In addition to the above information you will be required to supply the following supplemental information if your system is an XD, DD, DE or OT requiring three or more Central Office lines:

- Sequence in which the trunks are to be connected
- Facility interface codes by position
- Service order codes by position

  Note: The FCC registration label includes the ringer equivalence, because at the time FCC Part 68 was established, digital systems without ringing had not been established. Even though the ringer equivalence must appear on the label, it is inconsequential in the case of digital communications.

Connection of this unit to the nationwide telecommunications network must be through a standard network interface connector (RJ-48C or RJ-11) which must be ordered from the telephone company.

Telephone Company Rights and Responsibilities (North America)

If your data terminal equipment causes harm to the telephone network the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will be given the opportunity to correct the situation, and you will be informed of your right to file a complaint with the regulatory agency.

Your telephone company may make changes in its facilities, equipment, operation, or procedures that could affect the proper functioning of your data communications equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted service.

FCC Requirements

You must notify the telephone company whenever the Passport 4400 unit is connected to or disconnected from a telephone company line. This equipment complies with the Federal Communications Commission (FCC) Rules. On the back of this equipment is a label that contains, among other information, the FCC registration number.

Equipment Attachment Limitations for Operation in Canada

CP-01, Part I, Section 10.1

NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe

system, if present, are connected together. This precaution may be particularly important in rural areas.

> ⚠ ***Caution:*** Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

CP-01, Part I, Section 10.2

NOTICE: The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100.

Affidavit Requirements for Connections to Digital Services (US)

- An affidavit must be served to the telephone company whenever digital terminal equipment without encoded analog content and billing protection is used to transmit digital signals containing encoded analog content which are intended for eventual conversion into voice band analog signals and retransmitted on the network.
- The affidavit shall affirm that either no encoded analog content or billing information is being transmitted or that the out put of the device meets Part 68 encoded analog content or billing protection specification.
- The end user will be responsible for filing an affidavit with the local exchange carrier when connecting unprotected CPE to 1.544 Mbps or to Subrate digital services.
- Until such time as subrate terminal equipment is registered for voice applications, the affidavit requirement for subrate services is waived.

AFFIDAVIT FOR CONNECTION OF CUSTOMER PREMISES EQUIPMENT TO 1.544 MBPS AND/OR SUBRATE DIGITAL SERVICES

For the work to be performed in the certified territory of _____(Telco Name), State of_____, county of_____, I,_____(name), _____(business address)_____(telephone number) being duly sworn, state:
I have responsibility for the operation and maintenance of the terminal equipment to be connected to _____1.544 Mbps and/or _____Subrate digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specifications with respect to analog content and billing protection:
( ) I attest that all operations associated with the establishment, maintenance, and adjustment of the digital CPE with respect to encoded analog content and encoded billing protection information continuously complies with Part 68 of the FCC Rules and Regulations.
( ) The digital CPE does not transmit digital signal containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.
( ) The encoded analog content and billing protection is factory set and is not under the control of the customer.
I attest that the operator(s)/maintainer(s) of the digital CPE responsible for the establishment, maintenance, and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully having completed one of the following (check appropriate blocks):
( )_____a. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or
( )_____b. A training course provided by the customer or authorized representative using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or
( )_____c. An independent training course (e.g., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signal; or
( )_____d. In lieu of the preceding training requirements, the operation(s)/ maintainer(s) is (are) under the control of a supervisor trained in accordance with _____(circle one) above.

I agree to provide_____(telco's name) with proper documentation to demonstrate compliance with the information as provided in the preceding paragraph, if so requested.
_____(signature)
_____(title)
_____(date)
Subscribed and Sworn to before me this _____day of_____,(year)

_____
Notary Public
My commission expires:

Specifications C

Specifications

Base Unit - Physical Dimensions

3-slot Unit

Width	44.5 cm. (17.5 inches)
Height	12.1 cm. (4.75 inches)
Depth	30.5 cm. (12.0 inches)
Weight	6.20 kg. (13.7 pounds)

5-slot Unit

Width	44.5 cm. (17.5 inches)
Height	16.5 cm. (6.5 inches)
Depth	30.5 cm. (12.0 inches)
Weight	7.75 kg. (17.1 pounds)

5-slot Unit with Redundant Power Supply

Width	44.5 cm. (17.5 inches)
Height	27.3 cm. (10.75 inches)
Depth	30.5 cm. (12.0 inches)
Weight	9.18 kg. (20.1 pounds)

Base Unit - Operating Environment

Temperature

Operating	0 to 50°C (32 to 122°F)
Storage	-40 to 70°C (-40 to 158°F)

Relative Humidity

Operating	10-90% non-condensing
Storage	0-95% non-condensing

Power Requirements

AC:	100-240 volts AC, -5%, +10% 43-63 Hz, 160 Watts maximum (model 4430ac – 135 Watts max.)
DC:	36-72 volts DC @ 3A maximum
LDM:	+5 volts/20 amperes max (100 watts) +12 volts/2 amperes max (24 watts)

-12 volts/2 amperes max)24 watts)

T1 Voice Module

The following specifications pertain to the T1 Voice Module, dual port.

Interfaces:	2; DS-1 (network) and DSX-1 (local) 1.544 digital interface with D4 framing format 1.544 digital interface with ESF framing format
Connector:	RJ-48C
DS-1 (includes internal DSU/CSU)	
Number of DS0 Channels:	24 @ 64 kb/s
Line Buildout:	0, -7.5, -15 dB, hardware selectable
Interface Connector:	RJ-48C
Test Connector:	Mini Bantam
Receiver Sensitivity:	-34 dBm
DSX-1	
Number of DS0 Channels:	24 @ 64 kb/s
Line Buildout:	110 feet to 600 feet in increments of 110 feet; software selectable
Interface Connector:	RJ-48C
Test Connector:	Mini Bantam
Receiver Sensitivity:	-34 dBm
Drop and Insert:	All 24 DS0 channels may be passed directly between the DSX-1 and DS-1 interfaces or dropped and inserted to/from the Passport 4400 resources.
Data Ports:	2; DP1 and DP2 @ 512 kb/s maximum (each). Strappable for RS-232/V.24, X.21, and V.35 interface type.
Connector:	DB-25 female
Digital Voice Modules:	24 maximum; six are optionally mounted on the T1 Voice Module; additional modules are optionally mounted on adjacent Digital Voice Expansion Modules. Each Digital Voice Module processes one DS0 voice channel. Please note power supply requirements at the end of this chapter.

The following specifications pertain to the T1 Voice Module, single port.

T1 Interface:	DS-1 (network) With the exception of drop-and-insert and bypass, the single-port unit has the same capabilities as DS-1 interface of the dual port module.

E1 Voice Module

The following specifications pertain to the E1 Voice Module, dual port.

Interfaces:	2; L1 (local) and L2 (network) 2.049 Mb/s digital interface
Connector:	75 ohms BNC (4) 120 ohms DB-9 (1)
L1	
Number of DS0 Channels:	30 @ 64 kb/s
Interface Termination:	Strappable for either 75 ohm or 120 ohm termination
75 Ohm Connectors:	2 BNC coaxial connectors, one each for input and output wire pair
120 Ohm Connector:	9-pin DB-9 connector
Receiver Sensitivity:	-34 dBm
Drop and Insert:	All 30 DS0 channels may be passed directly between the L1 and L2 interfaces or dropped and inserted to/from the Passport 4400 resources.
L2	Identical to L1 in all respects
Data Ports:	2; DP1 and DP2 @ 512 kb/s maximum (each). Strappable for RS-232/V.24, X.21, and V.35 interface types.
Connector:	DB-25 female
Digital Voice Modules:	30 maximum; six are optionally mounted on the TVM; additional modules are optionally mounted on adjacent Digital Voice Expansion Modules. Each Digital Voice Module processes one DS0 voice channel. Please note power supply requirements at the end of this chapter.

The following specifications pertain to the E1 Voice Module, single port.

E1 Interface	L1 (local) With the exception of drop-and-insert and bypass, the single-port E1 unit model has the same capabilities as the dual port model.

Analog Voice Modules

The following specifications are common to all FXS, FXO, and E&M interface types:

Common Specifications

Signals Supported:	Analog voice and Group 3 facsimile
Fax Signal Types:	V.21 channel 2, V.27 ter 2400, V.27 ter 4800, V.29 7200, and V.29 9600
Modem Signal Types:	V.22 and V.22 bis
Port Impedance (FXS, FXO and E&M 2-wire)	Software selectable for either 600 ohms or for complex impedance
Insertion loss at 1004 Hz	
FXS and FXO:	2 dB nominal between transmit and receive of port 1 and transmit and receive of port 2
E&M:	2 dB nominal between T/R of port 1 and T/R of port 2 (2-wire) or between T/R of port 1 and T1/R1 of port 2 (4-wire)
Port Return Losses:	
Echo:	$\geq$22 dB
Singing:	$\geq$18 dB
204 to 3400 Hz:	$\geq$16 dB
Input Level Gain:	Adjustable from -6 dB to +19 dB in 1 dB increments
Output Level Attenuation:	Adjustable from 0 dB to 25 dB in 1 dB increments
Input and Output Level Adjustment Restrictions:	If your equipment is operated in the U.S.A. or Canada, input and output levels must be set to 0 dB.

Maximum Output Level:	+7 dB, E&M 4-wire enhanced only. All others 0 dB.
Longitudinal Balance	
200 to 1004 Hz	≥58 dB
1005 to 3404 Hz:	≥48 dB
Frequency Response Over the Range of 304 Hz to 3404 Hz:	+1 dB to -3 dB with respect to 1004 Hz for G.729 digitizing rates; +1 dB to -2 dB with respect to 1004 Hz, for all other digitizing rates
Idle Channel Noise	
Inband	
"C" Message:	≤20 dBrnc
PSofometric:	≤-65 dBmpo
Out of Band, 10 KHz-10 MHz Transverse or Longitudinal Noise:	≤-70 dBm
Non Linear Distortion, (Multitone Signal) Second and Third Harmonics:	≤40 dB below signal level
Signal-to-Noise Ratio at 1004 Hz:	≥35 dB
Echo Suppression:	≥35 dB
Echo Canceling FXS, FXO, E&M 2-wire:	≤16 ms or ≤1000 Km (600 miles)
Crosstalk (Near/Far End) Between Channels:	≤75 dB

Telephone Interfaces

PBX Tie Trunk:	E&M Types I, II and V, 2-wire or 4-wire
PBX Station or Central Office/PSTN:	FXO Loop Start, 2-wire
Key Telephone Systems, Telephone Set, or PBX CO Trunk:	FXS Loop Start, 2-wire
Interface Connectors Per Channel:	RJ1CX modular jack for FXS and FXO type interfaces, and RJ1CX modular jack for E&M type interfaces
Indicators per Channel:	OK, Local Off-Hook, Remote Off-Hook, Local Speech, Remote Speech, and Test
Diagnostics:	Self-Test, Loopback, Input Level Display

E&M Signaling Specifications

Signaling	
E-Lead Current Limit:	≤25 ma
M-Lead Sensitivity:	≤1400 ohms at 48V
DC Pulse Distortion:	≤3% at 10 pps
Signaling Formats	
AC:	DTMF & 2280 Hz (AC15, 4-wire)
DC:	Steady or Pulsed
DTMF Destoration:	<1.5%
DC Loop Range Including Instrument:	<900 ohms, 1373m (4500 feet) on 24 AWB wire
Signaling Types:	I, II, and V, as strapped

FXS Signaling Specifications

Signaling Formats	
AC:	DTMF
DC:	Pulsed
DTMF Distortion:	≤1.5% (transparently passed
Pulse Distortion:	<3%
Battery current into 130 ohm load:	≥36 milliamperes
Battery current into 900 ohm total loop:	20 milliamperes minimum
Ringing Tone (Software Selectable):	25 Hz (default), or 50 Hz ± 2 Hz
Ringing Voltage, with Ac Load of 2 Ringers (4000 ohms and zero line 25 Hz Tone:	≥54 VRMS
20 and 50 Hz Tones:	≥50 VRMS
Ringing Current:	≥16 milliamperes into 5000 ohm load
Ring Cadence	
Repeated Ring:	Matches ringing cadence from remote voice/fax channel
Interrupted Ring:	On for 2 seconds, off for 4 seconds.
Ringing Cadence Repeat Distortion:	≤2%

:

FXO Signaling Specifications

Model 5000V/XOL

Signaling Formats	
AC:	DTMF
DC:	Pulsed
TMF Distortion:	1≤1.15% (transparently passed)
Pulse Distortion:	≤3%
DC Loop Range	
48 V Battery:	≤1750 ohms
42.5 V Battery:	≤1500 ohms
Disconnect Supervision	
Tone:	Voice/fax transmission will be disconnected in response to a call progress tone of less than 600 Hz.
Power Interrupt:	Voice/fax transmission will be disconnected in response to a pulse of 600 ms minimum.
Off-Hook DC V/I Characteristics at Tip-Ring:	≤300 ohms (20 mA)
Ringing Voltage Input, 18 to 53 Hz	
Detect:	≥25 VRMS
Not Detect:	≤15 VRMS

Model 5000V/XOX)

Ring detector capacitance, when strapped for use in France:	0.37 of uf maximum
Off-hook and busy line current limit when strapped for use in Spain:	60 miliamperes
Interface resistance during dial pulsing when strapped for use in Germany/Switzerland:	<240 ohms

ISDN BRI Voice Module

The following specifications pertain to the ISDN BRI Voice Module.

Interface Type:	Basic Rate Interface (BRI)
Number of Channels:	2 B-channels, 1 D-channel
B-Channel:	Each B-channel carries PCM-coded voice at a rate of 64 kb/s
D-Channel:	The D-channel carries signaling information for both B-channels at a rate of 16 kb/s.
Signaling Type:	ETSI QSIG, utilizing the Basic Call (BC) protocol
Interface Emulation:	In its present application, the unit will be strapped for NT, connecting to the trunk side (TE) of an ISDN PBX.
Indicators:	Three green front-panel LED indicators, monitoring the activities of the 2 B-channels and the D-channel. See Table 1-1 for details
Number of Switches:	2 switch groups
Module Location:	This switch group is used to set the logical slot location that the module occupies within the Passport 4400 unit.
Port Termination:	This switch group is used to set the input impedance of the BRI port; default value is 100 W
Input Power Requirements:	+5 volts at 0.4 ampere (2 watts) maximum
Dimensions	
Width:	24.13 cm. (9.5 inches)
Depth:	26.04 cm. (10.25 inches)
Height:	2.54 cm. (1 inch) maximum

T1 Voice Module Cabling Requirements

D

The T1 Voice Module, like any other T1 device, uses two twisted wire pairs for connection to the T1 network. These wire pairs may include in-plant or on-campus wiring that is privately owned.

In order to select wire pairs, consider the following:

- A good system design separates the composite transmit and receive signals as much as possible.
- When wiring multiple devices:
  - — It is best to run all transmit signals in one cable, and all receive signals in another cable.
  - — An alternate method is to separate the transmit and receive signals with an internal screen, when available.
  - — If this is not possible, separate the transmit and receive signals by placing them in different binder groups within the same cable. Binder groups are used in larger cables (typically 25 pairs). Separating the transmit and receive signals will eliminate or minimize near-end crosstalk. With near-end crosstalk minimized, repeaters may be spaced at their maximum distance.
  - — Plan for two pairs for each DSX-1 T1 link.
  - — If your transmission facility includes exterior data links that will be exposed to weather, specify “filled exchange cable.” The grease-like filling protects the cable from the effects of moisture that would otherwise deteriorate the cable's high-frequency response. PVC-type conduit protects the cable from direct contact with water, but may not be adequate against condensation.

Note: All exterior lines (aerial or buried) at the entry point to buildings require lightning protection. The T1 Interface Module provides both primary and secondary lightning protection.

Shielded Cable Construction

Typical telephone cable consists of plastic-coated pairs of 22- or 24-gauge wire (very seldom l9-gauge) with a mutual capacitance of 0.083 uF/mile. The cable should be in good repair, free of moisture, and have satisfactory transmission characteristics at 772 kHz (loss of less than -33-# dB and crosstalk of less than -63 dB).

Each wire pair is uniquely color coded to distinguish it from all other wire pairs. A total of 25 different color codes are used for wire pairs. On larger cables with more than 25 wire pairs, the wires are formed into 25-pair groups, with each group repeating the same color-coding scheme. To distinguish one group from the next, each 25-pair group is itself color coded.

In cables of 100 pairs or larger, these color-coded groups are maintained and termed binder groups. In smaller cables, it is occasionally necessary to subdivide the color-coded group into separately wrapped pairs to form a smooth cable assembly. These subdivided groups preserve the color-coding, but, electrically, they are now in separate binder groups.

New cables now segregate the pairs within a cable into shielded compartments or groups, completely separating the transmit and receive pairs. This improvement to the near-end coupling losses of paired cables is achieved by the use of a special heavy-gauge foil barrier (screen) shielding. This effectively creates two cables within a single jacket. Crosstalk between sections is typically less than -100 dB. Examples of this type of cable are the T-Screen and D-Screen products offered by Superior Cable and General Cable, respectively.

Figure D-23. illustrates the cross sections of this type of shielded cables. As an example, consider the cable consisting of 12 wire pairs, divided by the shield into two binder groups. For span line 1, match wire pair 1 in one binder group with wire pair 7 in the other binder group; for span line 2, wire pair 2 would be matched with wire pair 8, and so on. Where the number of wire pairs is odd, such as the 25-pair cable, pairs 1 through 12 would be assigned one transmission direction, with pairs 13 through 24 assigned the corresponding return paths. Pair number 25 was not used. In the case of an even-pair cable, such as the 50-pair cable, pairs 1 through 25 are available for one transmission direction, while the corresponding pairs 26 through 50 are used for the corresponding return paths, with no pair left over.

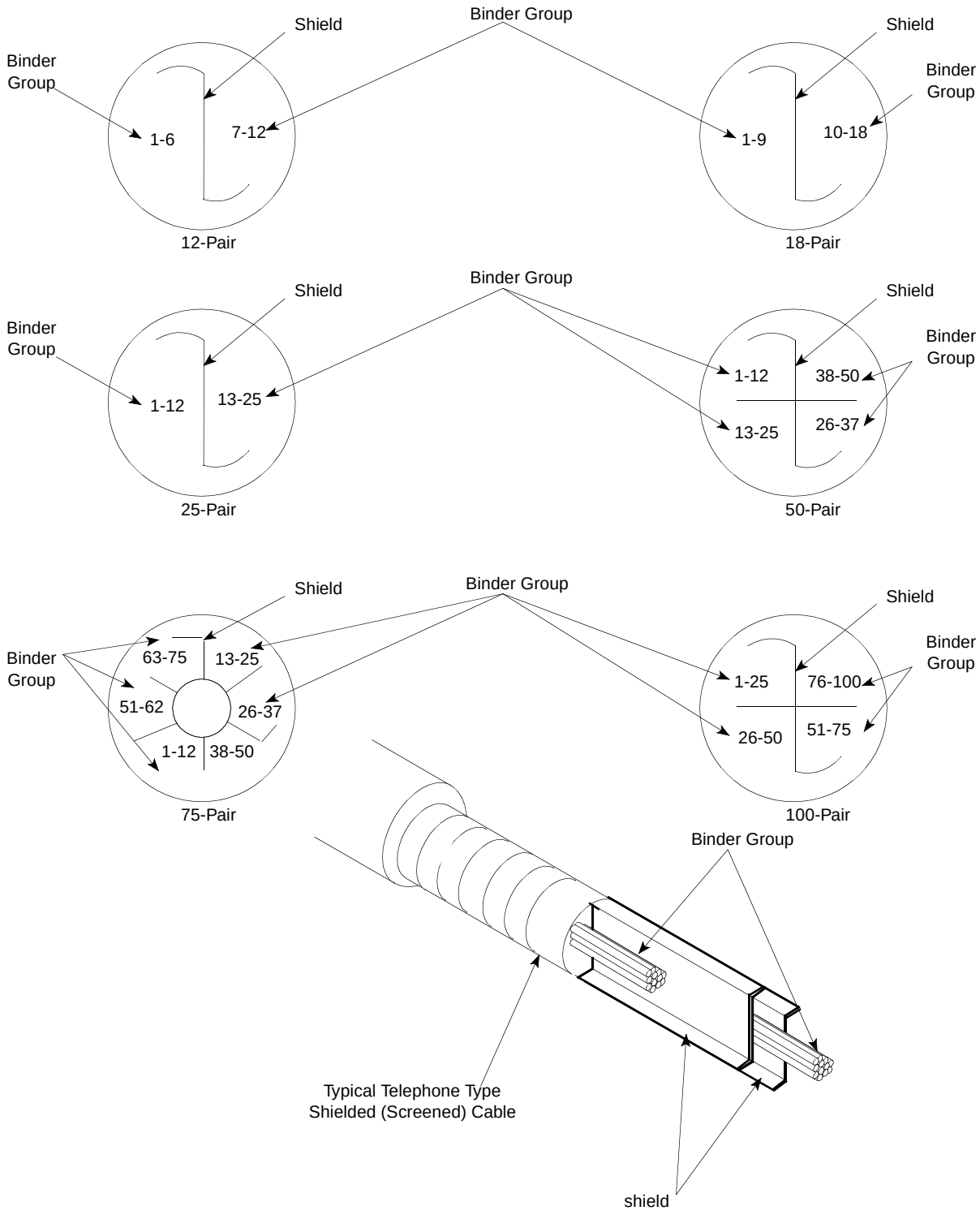


Figure D-23. Telephone Cable With Shield Separator

Calculating Usable Cable Distance

Usable cable distance varies as a function of wire gauge, insulation type, and temperature. Usable cable distance is also affected by the way transmit and receive pairs are assigned to binder groups, and by the number of systems operations in a binder group.

Table D-1 lists maximum distances on exchange-grade (exterior) cables when both transmit and receive pairs are in the same binder group. Values are tabulated for three binder-group sizes of four different wire gauges, at a temperature of 140#F (60#C). Note that the distance deteriorates when more systems are connected within the same binder group. The usable cable distances, as listed in Table D-1, may be increased by separating the transmit and receive pairs into adjacent binder groups, as shown in Table D-2

Note: If T1 signals are segregated to separate sides of a shielded cable, or if they only exist in non-adjacent binder groups, the top row of Table D-2 (1 System) is the usable distance.

As an example, assume that you have a 5200-foot, 50-pair, 24-gauge cable and wish to connect your T1 Voice Module to the T1 service. First, assume that the transmit and receive pairs are in the same binder group. Consulting Table D-1, it can be seen that one system would allow 5450 feet, but two systems reduce the usable span length to only 4940 feet, a distance short of the required 5200 feet.

As an alternative, consider separating the transmit and receive pairs into the two available 25-pair binder groups, and consult Table D-2 This time, the maximum span length went up to 5710 feet, a distance well within your requirements. According to Table D-2, the distance of 5200 feet would support more than four, but less than eight, systems (probably six) operating in this mode.

When the distance desired is longer than can be supported according to Table D-1 or Table D-2, as appropriate, review the cable routing to determine if there are sections of acceptable lengths that can be separated by T1 repeaters.

Table D-1. Maximum Distance of Exchange-Grade Telephone Cable, With Transmit and Receive Pairs in the Same Binder Group

Minimum Binder Size			Maximum Distance in Feet (Loss in dB)*			
18 pair	12 pair	6 pair	26 Awg	24 Awg	22 Awg	19 Awg
1 System	...	...	4220 (33)	5450 (32)	6530 (31)	8450 (29)
2 Systems	1 System	....	3840 (30)	4940 (29)	5890 (28)	7580 (26)
4 Systems	2 Systems	1 System	3450 (27)	4330 (26)	5260 (25)	6710 (23)
8 Systems	4 Systems	2 Systems	3070 (24)	3020 (23)	4630 (22)	5830 (20)
12 Systems	6 Systems	3 Systems	2840 (22.2)	3610 (21.2)	4250 (20.2)	5310 (18.2)

* Values for 140° F(60°C) maximum temperature. Distance will increase slightly with lower temperatures.

Table D-2. Maximum Distance of Exchange-Grade Telephone Cable, With Transmit and Receive Pairs in Different Binder Groups

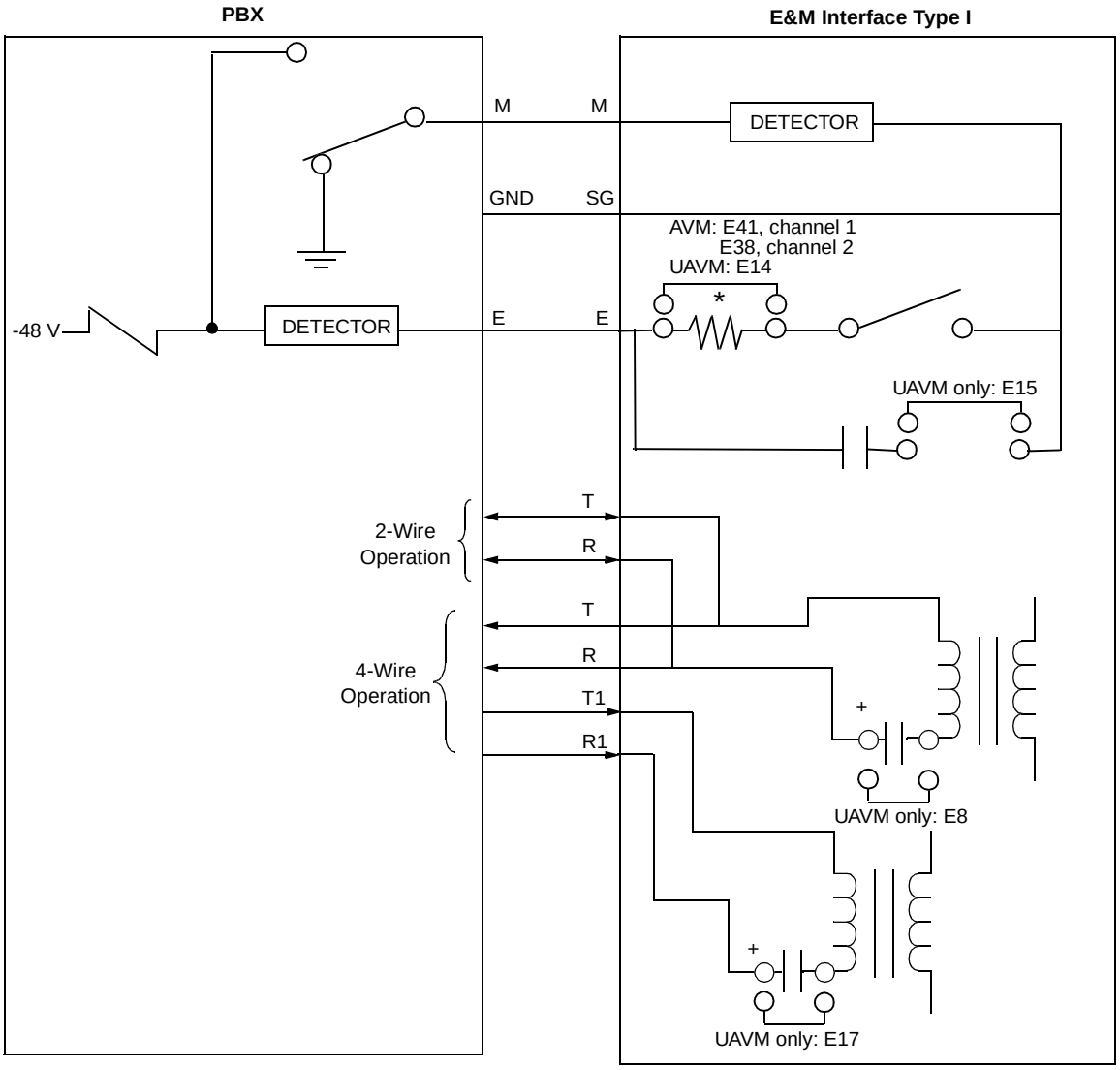
Minimum Binder Size			Maximum Distance in Feet (Loss in dB)*			
18 pair	12 pair	6 pair	26 Awg	24 Awg	22 Awg	19 Awg
1 System	...	...	4280 (33.5)	5710 (33.5)	7050 (33.5)	9770 (33.5)
1 System	1 System	...	4280 (33.5)	5710 (33.5)	7050 (33.5)	9330 (32)
1 System	2 Systems	1 System	4220 (27)	5450 (32)	6530 (31)	8450 (28)
1 System	4 System	2 System	3840 (30)	4940 (29)	5890 (28)	7580 (26)
1 System	6 Systems	3 System	3610 (28.2)	4630 (27.2)	5520 (26.2)	7060 (24.2)
1 System	8 Systems	4 Systems	3450 (27)	4430 (26)	5260 (25)	6710 (23)
1 System	12 Systems	6 Systems	3200 (25)	4090 (24)	4840 (23)	6120 (21)

* Values for 140 °F(60 °C) maximum temperature. Distance will increase slightly with lower temperatures.

PBX Interface Connection Diagrams

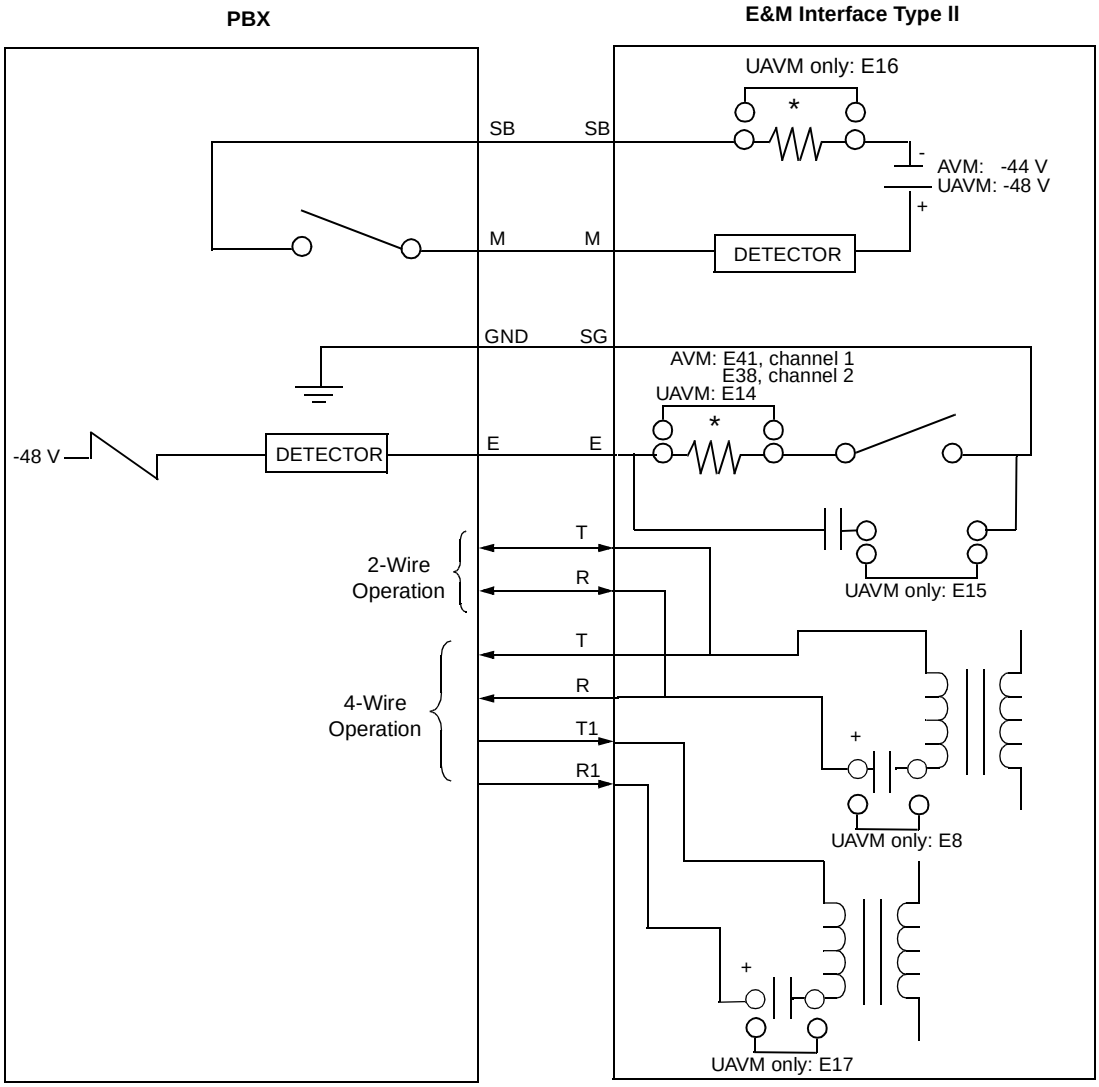
E

Figures E-1 through E-3 show the circuit connections between an E&M voice channel and the PBX for signaling Types I, II, and V.



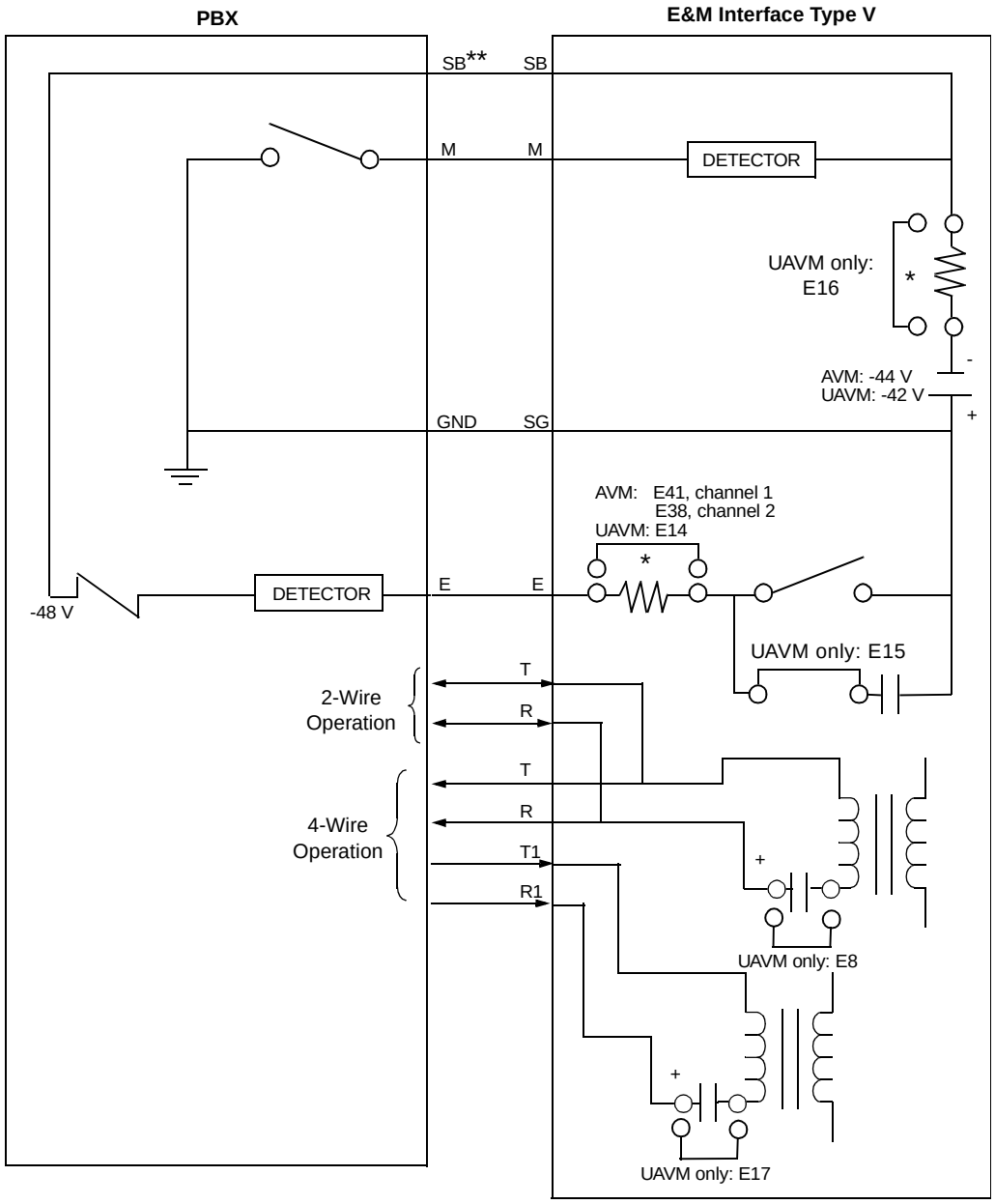
* Install jumpers when cable distance to PBX is too long.

Figure E-24. E&M Type Interface Connection Diagram



* Install jumpers when cable distance to PBX is too long.

Figure E-25. E&M Type II Interface Connection Diagram



* Install jumpers when cable distance to PBX is too long.

> ***Caution:*** *** PBX SB and Voice Module SB are to be connected only when -48 volt supply is not available on the PBX side.*

Figure E-26. E&M Type V Interface Connection Diagram

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